

# Grand Canyon

National Park Service  
U.S. Department of the Interior  
Grand Canyon National Park



## Environmental Assessment September 2004



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### Construct, Rehabilitate and Repair Restrooms Parkwide

Grand Canyon National Park • Arizona

## Environmental Assessment

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### Construct, Rehabilitate and Repair Restrooms Parkwide Grand Canyon National Park • Arizona

#### Summary

Grand Canyon National Park proposes to rehabilitate five existing restrooms, replace existing chemical toilets at ten sites with prefabricated vault toilets and construct a new restroom at three sites that currently do not have a toilet. Proposed restroom locations occur on the South Rim, Desert View, North Rim, Bright Angel Trail, Indian Garden and Phantom Ranch.

This Environmental Assessment (EA) evaluates three alternatives for addressing the purpose and need for action, including one no action alternative and two action alternatives. Alternative B would result in a total of approximately 1.9 acres of ground disturbance immediately adjacent to existing disturbed sites, removal of up to 13 small trees, would require up to 22 – 30 helicopter flights for transport of construction materials into the inner canyon and would require up to 8 helicopter flights per year for annual remove of compost from new inner canyon toilets. Alternative C would result in a total of approximately 1.75 acres of ground disturbance immediately adjacent to existing disturbed sites, removal of up to 13 small trees, would require up to 17 to 25 helicopter flights into the inner canyon for transport of construction materials, and would require up to 12 helicopter flights per year for annual removal of compost from new inner canyon toilets. The primary difference between the two action alternatives is in the size of the composting toilet proposed near the Three Mile rest house along the Bright Angel Trail. Alternative B proposes a three-stall composting toilet, while Alternative C proposes a somewhat smaller two-stall composting unit.

Neither action alternative would have more than negligible impacts to soils and water, vegetation, general wildlife populations and species of interest, air quality, floodplains and wetlands, prime and unique farmland, environmental justice or socioeconomics. Alternative B and Alternative C would result in adverse impacts to special status species, wilderness, soundscape, archeological resources, historic resources, cultural landscapes, ethnographic resources, visitor experience and park operations that range from negligible to moderate and are both short- and long-term. Beneficial impacts would occur to historic resources, cultural landscapes, visitor experience and park operations that range from minor to moderate. No impairment of park resources would occur with implementation of any alternative.

#### Public Comment

This environmental assessment (EA) will be on public review for 30 days. If you wish to comment on this EA, you may mail comments to the name and address below, no later than **October 8, 2004**. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

#### Please Address Comments to:

Joseph F. Alston, Superintendent, Grand Canyon National Park  
Attention: Sara White, Compliance Officer  
P.O. Box 129 / 1 Village Loop  
Grand Canyon, Arizona 86023

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# Chapter 1 – Project Scope

## INTRODUCTION

The purpose of this document is to disclose the expected effects to the human environment of various components of the proposed parkwide restroom construction, rehabilitation and repair project. The human environment is defined as the natural and physical environment and the relationship of people with that environment. The restrooms that are part of this project occur on the South Rim, Desert View, Inner Canyon and North Rim (Figure 1). The proposal includes rehabilitation of five existing restrooms, replacement of chemical toilets with new vault toilets at ten sites and construction of three new restrooms. Table 1 lists the sites included in this project and their locations.

## PURPOSE OF AND NEED FOR ACTION

The purpose of the restroom proposal is to address needed repairs and current inadequacies of many restrooms throughout the park. Most of the existing restrooms at Grand Canyon National Park are old and often overcrowded, inadequate for the average number of visitors, or are portable chemical toilets added to meet increasing demand. The poor condition of restrooms and the lack of adequate restroom facilities are one of the primary complaints received by Park visitors. The lack of a potable water source at Pipe Creek along the Bright Angel Trail is also a common visitor complaint and a concern among backcountry rangers. This replacement and rehabilitation proposal is needed to address the following management concerns:

- Many of the existing chemical toilets in the park are under-sized portable toilets that must be pumped frequently during peak visitor use seasons to avoid overflowing.
- The existing restroom at Yavapai Observation Station is inadequate. It was built in the 1960's and is in need of repairs and upgrading. The building's low slope does not shed water and snow effectively and the walkways and paths near the restroom do not meet accessibility standards. In addition, the current capacity of this restroom is not meeting the current demands at this popular visitor destination and needs to be expanded.
- The existing restroom at Hermits Rest is substandard and inadequate. There is a strong chemical odor due to the large number of units necessary to meet visitor needs at this popular visitor destination. Toilets are in cramped spaces. The restroom does not meet current accessibility standards. There are existing conflicts between vehicles and pedestrians in the area around the restrooms and redesign of the site is needed to eliminate or minimize conflicts.
- The Desert View campground restroom is approximately 15 years old and is beginning to show signs of wear, particularly in the interior where fixtures and wall and floor finishes are damaged. The heat and ventilation system is inadequate and the roof is in need of repair.
- There is currently no restroom facility at Three Mile or Pipe Creek along the Bright Angel Trail or at the Yaki picnic area along East Rim Drive on the South Rim. A restroom facility at each of these locations is necessary to meet public demand in these areas. Visitors in these areas, in the absence of a toilet nearby, often use the surrounding area which results in unsanitary conditions and localized problems that negatively affect other park visitors and park resources.
- There is currently no potable water source at the remote Pipe Creek rest house along the Bright Angel Trail, although water (piped from the nearby creek) used to be available here. Many visitors pass through this remote area and expect a water source at this rest house and are unprepared to purify creek water, increasing safety risks due to dehydration.

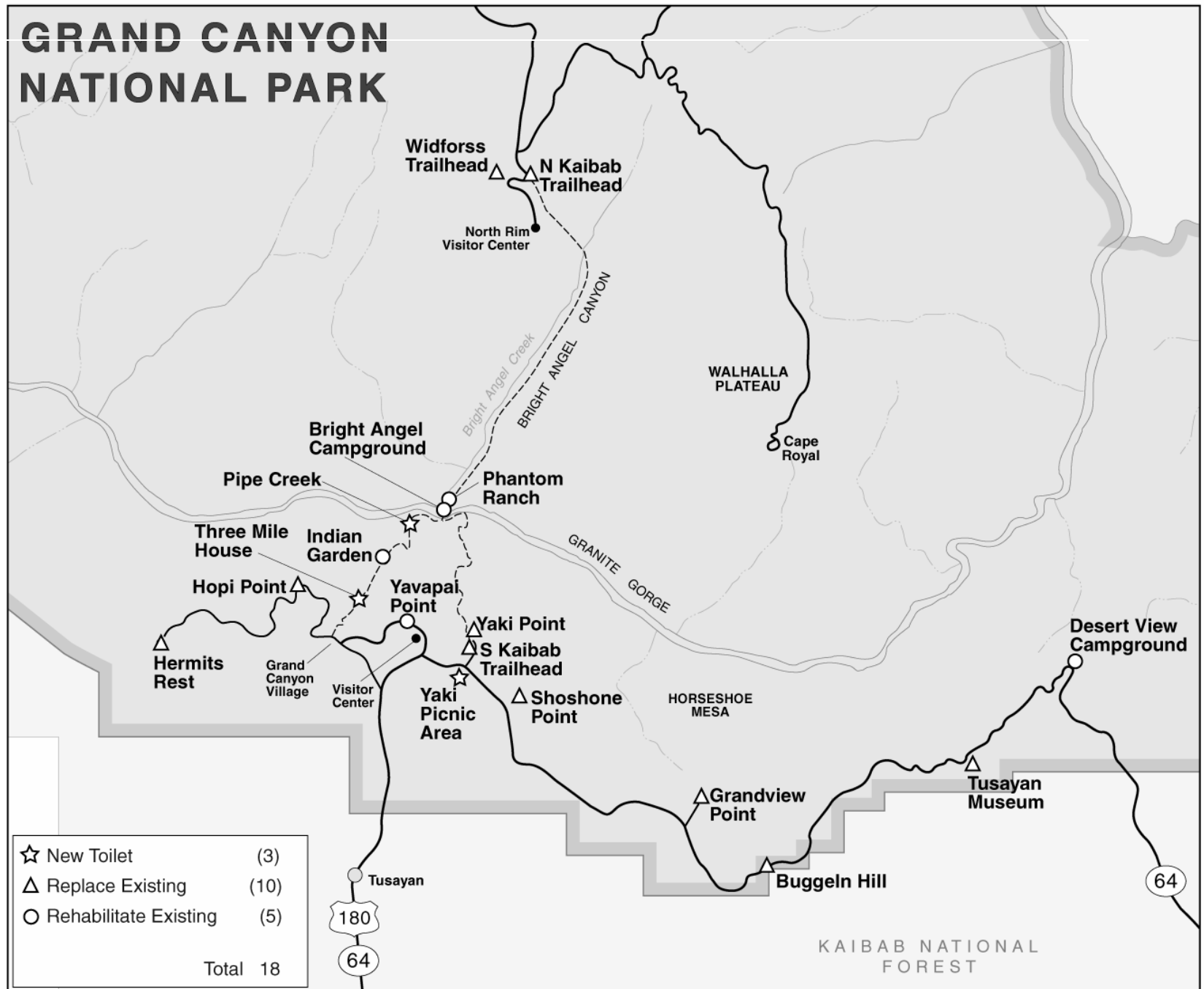
## Objectives of the Action

1. Provide adequately-sized restroom facilities to meet current needs and anticipated future visitor demand and that maximize the length of time between maintenance trips.
2. Provide clean, functional and serviceable restroom facilities that implement the concepts of sustainable facility design, and that are aesthetically pleasing and appropriate for their location within Grand Canyon National Park.
3. Provide a potable water source at Pipe Creek rest house along the Bright Angel trail.
4. Minimize new ground disturbance and tree removal.

Table 1. Restrooms proposed for construction, rehabilitation or repair, Grand Canyon National Park.

| Site Name                                   | Location                             | Proposed Action Category |
|---|--------------------------------------|--------------------------|
| <b>South Rim</b>                            |                                      |                          |
| Hermits Rest                                | West Rim Drive                       | Replacement              |
| Hopi Point Overlook                         | West Rim Drive                       | Replacement              |
| Yavapai Observation Station                 | Yavapai Point                        | Rehabilitation           |
| South Kaibab Trailhead                      | East Rim Drive                       | Replacement              |
| Yaki Point                                  | East Rim Drive                       | Replacement              |
| Yaki Picnic Area                            | East Rim Drive                       | New Construction         |
| Shoshone Point                              | East Rim Drive                       | Replacement              |
| Grandview Trailhead                         | East Rim Drive                       | Replacement              |
| Buggeln Hill Picnic Area                    | East Rim Drive                       | Replacement              |
| Tusayan Museum                              | East Rim Drive                       | Replacement              |
| <b>Desert View</b>                          |                                      |                          |
| Desert View Campground                      | Desert View                          | Rehabilitation           |
| <b>Inner Canyon – Cross Canyon Corridor</b> |                                      |                          |
| Three Mile                                  | Bright Angel Trail                   | New Construction         |
| Indian Garden                               | Bright Angel Trail                   | Rehabilitation           |
| Pipe Creek                                  | Bright Angel Trail                   | New Construction         |
| Phantom Ranch                               | River Trail, near Bright Angel Creek | Rehabilitation           |
| Bright Angel Campground                     | Phantom Ranch                        | Rehabilitation           |
| <b>North Rim</b>                            |                                      |                          |
| North Kaibab Trailhead                      | Bright Angel Peninsula               | Replacement              |
| Widforss Trailhead                          | Just north of Bright Angel Peninsula | Replacement              |

Figure 1. Site Map



## MANAGEMENT AND PLANNING HISTORY

*National Park Service Management Policies (2001)* is the guiding document for management of all national parks within the national park system. It is the basic Service-wide policy document of the National Park Service that supercedes the 1988 edition. It is the highest of three levels of guidance documents in the NPS Directives System. As stated in the introduction, “It (NPS Directives System) is designed to provide NPS management and staff with clear and continuously updated information on NPS policy and required and/or recommended actions, as well as any other information that will help them manage parks and programs effectively.” Among direction on all aspects of park management, these Management Policies set forth direction for each unit of the national park system to maintain an up-to-date General Management Plan. Chapter 9–Park Facilities is applicable to this project.

Grand Canyon National Park is currently operating under the direction of the *1995 General Management Plan (GMP)*. This plan provides guidance for resource management, visitor use, and general development for a period of 10 to 15 years. The primary purpose of the Plan is to provide a foundation from which to protect park resources while providing for meaningful visitor experiences. The restrooms included in this document are all part of a development zone, which prescribes the area to provide and maintain facilities for serving park managers and visitors. A summary of the GMP as it applies to this project is provided in Appendix A. Restrooms are specifically mentioned in the GMP in the following places:

Page 34, South Rim: “Numerous restrooms will be added along the South Rim, particularly at all major parking/staging areas and orientation centers, all food service and interpretive facilities in the village, ..... the South Kaibab trailhead, Yaki Point, and the Tusayan Museum. In high use areas where water is not available, water-conserving toilets will be added. This type of toilet will replace facilities at Hermit’s Rest and could be added near the Hopi, Grandview and Lipan overlooks.”

Page 44, North Rim: “...parking lot at North Kaibab Trailhead will be removed.....transit center will have a shelter, waiting area, information panels and restrooms.”

Page 48, North Rim: “Water conserving toilets will be placed at major overlooks on the Walhalla Plateau and at the Widforss Trailhead.”

Page 56, Corridor Trails: “Existing toilets along the trails will be replaced with water-conserving models, and more toilets will be added, if needed.”

As shown, the restrooms included in this proposal are consistent with this GMP direction. One site, the North Kaibab Trailhead, is identified in the GMP for removal. However, the park is currently undertaking a development planning effort for the North Rim (Appendix E) that will evaluate in detail GMP direction regarding transit and visitor orientation. Until this development planning effort is complete, no changes would be made to the North Kaibab Trailhead parking area. Proposed replacement of the existing chemical toilet at the trailhead with a vault toilet is in keeping with direction in the GMP to provide sustainable structures that are water-conserving. If, during the development planning effort or other North Rim planning efforts, it is determined to move the trailhead parking area, this vault toilet could also be moved.

Preliminary internal scoping to identify concerns of National Park Service (NPS) specialists regarding the proposal occurred during a meeting on 17 April 2000, during a November 2000 review and discussion of a draft pre-design package and discussions with pertinent park resource specialists during November – January 2000. Site visits took place in July 2000 and periodically since that time



for various aspects of the project. Aspects of the proposal were discussed with the Park's project review board on 5 March 2001, 19 March 2001, 17 September 2002 and 15 March 2004. The proposal was reviewed by the project's interdisciplinary team on 9 July 2003, 30 October 2003. An internal review of the draft EA was conducted in June – July 2004.

### Public Scoping

A public scoping letter, which described the overall parkwide restroom rehabilitation proposal in addition to two other projects, was submitted to an approximately 300-person Grand Canyon National Park mailing list on 8 December 2000. This letter was also posted on the park's website. The purpose of the scoping letter was to describe the proposed action to any interested/affected parties and solicit comments from those who may have issues with the proposed action(s). Three comments were received including one from the U.S. Fish and Wildlife Service that provided a species list, one from the Hopi Tribe offering no specific comment on the proposal but requesting a meeting, and one from Nava-Hopi Gray Line Tours agreeing that there is a need for additional restrooms but that there is not a high priority for taking action.

An additional public scoping letter, describing several projects proposed for the North Rim, including rehabilitation of restrooms at the North Kaibab Trailhead and Widforss Trailhead, was submitted to this same park mailing list on November 29, 2000. This letter was also posted on the park's website. Four comments were received including one from the Zuni Heritage and Historic Preservation Office offering no specific comment; one from the National Tour Association offering support for North Rim projects; one from Five County Association of Governments offering support for North Rim projects; and one from the Kaibab Band of Paiute Indians stating that restrooms should be located within disturbed areas, should avoid archeological and other cultural sites and should not be constructed near overlooks.

NPS staff met with personnel from USFWS and AGFD on 13 December 2000 to discuss this project proposal and other future proposals. NPS staff met with USFWS several times between March and June 2002 to discuss this project proposal in conjunction with a batch consultation for multiple proposed construction projects, including the rehabilitation and replacement of restrooms throughout the Park. Concurrence on the batch consultation was received from USFWS on 9 July 2002 and indicated that the projects may affect but are not likely to adversely affect the Mexican spotted owl, California condor, bald eagle, or sentry milk-vetch. Potential impacts to peregrine falcons were also included in this document.

This EA incorporates by reference and tiers to the *General Management Plan Environmental Impact Statement* (July 1995).

## ISSUES AND IMPACT TOPICS

Various agencies have been contacted and consulted as part of this environmental analysis. Appropriate federal, state, and local agencies have been contacted for input and review (see Chapter 5 for a list of persons contacted). National Park Service specialists, with input from federal, state, and local agencies identified issues and concerns (i.e. impact topics) affecting this project. After public scoping, issues and concerns were distilled into distinct impact topics to facilitate the analysis of environmental consequences, which allows for a standardized comparison between alternatives based on the most relevant information.

An issue is an effect on a physical, biological, social, or economic resource. The predicted effects of an activity create the issue. Issues may come from the public, from within an agency or department, or from another agency (Freeman and Jenson 1998). For this project, the interdisciplinary team identified issues with various proposed alternatives. Although several responses to the scoping letter

were received from the public and other agencies, no additional significant issues came forward through this scoping effort. Once issues were identified, they were used to help formulate alternatives and mitigation measures. Impact topics were then selected for detailed analysis based on substantive issues, environmental statutes, regulations, executive orders, and *NPS Management Policies* (2001). A summary of some of these compliance-related laws and regulations is provided in Appendix B. A summary of the impact topics and rationale for selection/dismissal are given below.

## Relevant Impact Topics

**Special Status Species** - There are several special status species, including several threatened, endangered and proposed species that have the potential to occur in Coconino County, based on information from the U.S. Fish and Wildlife Service, the Arizona Game and Fish Department, and Grand Canyon National Park biologists. In response to a request for a list of federally listed species in the project areas, the U.S. Fish and Wildlife Service (USFWS) in a letter dated 12 February 2001 (USFWS Reference #2-21-01-I-145), provided a list of threatened, endangered and proposed species that have the potential to occur in Coconino County. Representatives from these agencies met to discuss this and other Park projects in December 2000. Table 2 lists threatened, endangered, proposed, and species of concern known to occur near restroom sites or species whose habitat may be present in the vicinity of restroom sites. Nine federally listed wildlife and plant species are known to occur in Grand Canyon National Park. Representatives from USFWS and the NPS also met to discuss multiple proposed projects during the preparation of the Parkwide Construction Program Batch Biological Assessment during March – June 2002 (NPS 2002). Sixteen of the eighteen proposed restrooms that are part of this project were included in this 2002 batch consultation with the USFWS. USFWS concurred with the park's determination of effect to federally listed species on 9 July 2002. The two restroom sites not included in the batch consultation are the subject of a separate biological assessment (NPS 2004). Consultation with USFWS on this biological assessment is underway at this time.

The list in Table 2 was developed from personal knowledge of the area by Park biologists, Park records, the AGFD Heritage Nongame Data Management System database (2003), and Arizona Game and Fish Department and U.S. Fish and Wildlife Service biologists. The potential for impact to these species will be discussed in Chapter 3.

Table 2. Special status species known to occur in the vicinity of park restroom locations or species whose habitat may be present in the vicinity of park restroom locations, Grand Canyon National Park.

| Species               | Scientific Name   | Status                           |
|-----------------------|---|----------------------------------|
| Mexican Spotted Owl   | <i>Strix occidentalis lucida</i>  | T, WC                            |
| California Condor     | <i>Gymnogyps californicus</i>   | T*, WC                           |
| Bald Eagle            | <i>Haliaeetus leucephalus</i>   | T, WC                            |
| Peregrine Falcon      | <i>Falco peregrinus anatum</i>  | delisted                         |
| Northern Goshawk      | <i>Accipiter gentilis</i>   | WC                               |
| Niobrara Ambersnail   | <i>Oxyloma haydeni</i> , closely related to <i>Oxyloma haydeni kanabensis</i> | WC, closely related to E species |
| Grand Canyon Catchfly | <i>Silene rectiramea</i>  | SC                               |

**Key:** T = federally listed as threatened under the Endangered Species Act (ESA); WC = Wildlife species of special concern in Arizona (AZ Game and Fish Department 10/14/96); SC = former species of concern to the US Fish and Wildlife Service, but for which there is no legal status (all former C2 species Fed Reg. 2/28/96); T\* = federally listed as an experimental non-essential population in Arizona, but in National Parks the species is considered federally listed as threatened under ESA.

**Soundscapes** - The NPS is mandated by Director's Order 47 to protect, maintain, or restore the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with Parks and Park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many Parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the Service's ability to accomplish its mission. Implementing the proposed action would generate construction-related noise in the project areas, in some cases above ambient conditions. Noise sources include motorized heavy construction equipment, power tools and possibly blasting in certain situations. The methods used to transport equipment, materials and supplies into the project sites in the inner canyon would also generate additional noise. Noise impacts, particularly from helicopters, will be discussed in Chapter 3.

**Wilderness** - Most of the Grand Canyon lies within proposed wilderness. NPS policies require that these proposed areas be managed under the provisions of the Wilderness Act. None of the 18 toilet sites included in this proposal occurs in wilderness, but several sites (Three Mile, Pipe Creek, Indian Garden, Bright Angel Campground, and Phantom Ranch) occur along the cross-canyon corridor, adjacent to proposed wilderness, and the Widforss Trailhead occurs adjacent to proposed wilderness on the North Rim. The Widforss Trailhead area and parking lot lies within a 300-foot wide nonwilderness corridor (the W1 or Basin Road) while the Widforss Trail itself, also known as the W1c Road, is within proposed wilderness. While rehabilitation and maintenance of existing restrooms in developed areas near Phantom Ranch and Indian Garden are in keeping with the GMP and would not affect wilderness, the methods used to transport in necessary materials for the rehabilitation have the potential to affect wilderness. Helicopters would be necessary to transport materials needed for the proposed construction of two new composting toilets along the Bright Angel Trail. The installation of new restrooms along the corridor trails is consistent with the 1995 GMP and the 1988 Backcountry Management Plan, but does have the potential to affect adjacent wilderness areas. A minimum requirements analysis for this project is summarized in Appendix F and discussed in Chapter 3.

**Cultural Resources** – The 1966 National Historic Preservation Act, as amended, NEPA, the 1916 NPS Organic Act, the 2001 NPS Management Policies and other NPS guidelines require consideration of impacts on cultural resources. Project undertakings have the potential to affect archaeological resources, historic resources, including buildings and structures listed in or eligible for listing in the National Register of Historic Places, historic cultural landscape resources, and ethnographic resources. Therefore, these cultural resource topics will be discussed in Chapter 3.

**Park Operations** – Park operations such as maintenance of the restrooms, and maintenance and upkeep of associated roads, grounds and trails would be affected to some degree by the proposal. This topic will be discussed in Chapter 3.

**Visitor Experience** – The 1916 NPS Organic Act and the 2001 NPS Management Policies direct national parks to provide for public enjoyment. The availability and condition of restrooms throughout the park directly affects the experience of park visitors. This topic will be discussed in Chapter 3.

### **Impact Topics Dismissed from Further Analysis**

**Soils and Water** - Proposed activities would result in only minimal new ground disturbance and would only negligibly affect soils in the immediate project areas. No perennial water sources occur in or near any of the project areas, with the exception of Pipe Creek. Mitigation measures have been developed to minimize the potential for soil movement and for the project to otherwise

impact soil and water resources. The majority of the restrooms proposed are vault toilets that do not require the use of water. The Pipe Creek proposed composting toilet is the only site proposed that is in the vicinity of a drainage, Pipe Creek. This creek is perennial in some stretches and supports some riparian vegetation. The proposed toilet would be installed near the rest house in an existing disturbed area void of vegetation. Indirect impacts from the construction (sedimentation) would be minimized by implementation of mitigation measures. Mitigation measures specific to Pipe Creek are included at the end of Chapter 2. The flush restrooms that are part of this project are simply rehabilitation of existing flush restrooms where waterlines and necessary utilities are already in place. Most toilets would be installed in the same general location as the existing toilets and would occur in disturbed areas. In addition to Pipe Creek, the other two new installations (Yaki Picnic Area and Three Mile) would require some soil disturbance in a small area, but these areas are adjacent to existing trails and areas frequently used by visitors. Implementation of mitigation measures would minimize the likelihood of effects off-site. Therefore, soils and water resources were dismissed from further analysis.

**Vegetation** - Proposed activities would result in only minimal new ground disturbance and would only negligibly affect vegetation in the immediate project areas. The majority of the project areas are existing disturbed sites where toilets already exist, and where vegetation is limited. While some minor plant removal may be necessary in some situations, this would be minimal, localized and site-specific. Efforts would be taken to minimize plant removal, especially trees, as much as possible. Mitigation measures have been developed to minimize the potential for adverse impacts to vegetation, including the potential for exotic species introduction or spread. Measures applicable to the project also address salvage of native species and replanting, where necessary. The proposed composting toilet at Pipe Creek is in the vicinity of Pipe Creek, which, while not considered a wetland, does support some riparian vegetation. While some riparian vegetation may be disturbed during installation of approximately 200 yards of potable waterline, it is expected to be minimal and efforts would be made to avoid vegetation disturbance as much as possible. Consultation with the Inner Canyon Restoration Biologist would occur prior to pipeline installation to ensure that vegetation disturbance is minimized. Very little upland vegetation near the proposed toilet site would be removed during construction. Therefore, vegetation was dismissed from further analysis.

**General Wildlife Populations/Species of Interest:** Grand Canyon National Park is extremely diverse in terms of topography and vegetation and provides habitat for a wide variety of wildlife species. The potential for impacts to occur to general wildlife populations and species of interest are minimized by the fact that all of the proposed sites are already high visitor use areas, substantial vegetation and ground disturbance would not occur at any of the locations and that, with the exception of Three Mile, Pipe Creek and Yaki Picnic Area, all toilets currently exist and are being used by visitors. Habitat for wildlife species would not be altered by implementation of any of the alternatives and cyclic and periodic empty/removal methods would not result in substantial disturbance to key wildlife habitat. Helicopter use proposed for transport of materials needed to construct Three Mile and Pipe Creek composting toilets is one method that could disrupt wildlife populations due to the higher than normal noise generated in the immediate vicinity of a toilet location, or near the flight path. However, helicopter use would be short-term lasting only the duration of the flights. For these reasons, implementation of any of the alternatives would result in negligible impacts to general wildlife populations and species of interest. Therefore, this topic was dismissed from detailed analysis. Potential impacts to special status wildlife and plant species are discussed in Chapter 3.

**Air Quality** - Clean, clear air is essential to preserve the resources in Grand Canyon National Park, as well as for visitors to appreciate those resources. Grand Canyon National Park is a federally mandated Class I area under the Clean Air Act. As such, air in the Park receives the most stringent protection against increases in air pollution and in further degradation of air quality

related values. The Act then sets a further goal of natural visibility conditions, free of human-caused haze. Air quality in the Park is generally quite good. Pollution levels monitored in the Park fall below the levels established by the Environmental Protection Agency to protect human health and welfare. However, the ability to see through the air (visibility) is usually well below natural levels because of air pollution. Most of this pollution originates far outside the Park's boundaries, and arrives in the Park as a well-mixed regional haze, rather than as distinct plumes.

Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The park's air quality specialist has determined that this project, due to its limited scope, would not require consultation with the State of Arizona regarding air quality. However, because there is some ground disturbance involved, there is a possibility of raising fugitive dust during project implementation or from disturbed areas afterwards. After project completion, building and paving footprints would address dust there. Revegetation of disturbed areas if needed, after work is complete, would provide long-term dust control. Mulch and the plants themselves would stabilize the soil surface and reduce wind speed/shear against the ground surface.

Trenching and other minor on-site work would increase dust and combustion-related emissions. Dust raised during ground disturbance would be limited by the size of the project and the equipment used. By clearly marking boundaries of the project area, unnecessary soil disturbance, and consequent dust generation, would be avoided. Water sprinkling can control fugitive dust emissions from light traffic in the project area. Construction equipment itself can adversely affect air quality by exhaust emissions. Minimizing the extent to which construction equipment idles would help to reduce this effect. Minimizing idling would also help to reduce noise impacts during construction as well. The proposed project components occur within developments zone. Indirect air quality impacts from routine daily vehicle emissions from visitors, employees and official business would be unchanged.

Therefore, local air quality may be temporarily degraded by dust generated from construction activities under the action alternatives, and emissions from construction equipment. This degradation would result in an overall negligible impact to air quality, and would last only as long as renovation activities occurred. Impacts to overall park air quality or regional air quality are not expected. Likewise, impacts from foreseeable future projects in the area would be negligible and would be restricted to the period of construction. Therefore, air quality was dismissed from further analysis.

**Floodplains and Wetlands** - Executive Order 11988 (Floodplains) and Executive Order 11990 (Wetlands), which require federal agencies to examine the potential impacts of actions on floodplains and wetlands, were reviewed for applicability to this project. Impacts to floodplains and wetlands were considered for this project, but determined not be significant. Proposed actions would not impact areas designated as wetlands (J.Rihs, pers. comm. 2004). The one site in closest proximity to a stream (Pipe Creek) was evaluated for potential impacts to floodplain values. It was determined that the proposed construction of a composting toilet in this area is not subject to floodplain regulations (M. Martin, pers. comm.. 2004). Measures, however, have been developed to ensure that any potential for flooding is addressed during site selection and building design, as described under the alternative descriptions and in mitigation measures listed at the end of Chapter 2. For these reasons, floodplains and wetlands were dismissed from further analysis.

**Prime and Unique Farmland** – The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of these lands to non-agricultural uses. Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed;

unique farmland produces specialty crops such as fruits, vegetables and nuts. This proposed project locations and surrounding lands have been evaluated by appropriate park technical area specialists and by specialists from the Natural Resources Conservation Service (NRCS). Based on their observations, the project area is not considered prime or unique farmland (Camp, pers. comm. 2002). Therefore, this topic was dismissed from further analysis.

**Environmental Justice** – Executive Order 12898 requires consideration of impacts to minority and low-income populations to ensure that these populations do not receive a disproportionately high number of adverse or human health impacts. This issue was dismissed from further analysis for this project because each alternative would affect everyone equally and would not disproportionately impact minority or low-income populations.

**Socioeconomic Environment** – Socioeconomic values consist of local and regional businesses and residents, the local and regional economy and park concessions. The local economy and most business of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. The GMP EIS discussed the socioeconomic environment and impacts extensively. There may be short-term benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would be negligibly affected in the long-term. Therefore, impacts, both adverse and beneficial, would be negligible and thus socioeconomic values were dismissed from further analysis.

## ADDITIONAL NEPA ANALYSIS

The alternatives include all reasonably foreseeable connected actions. Environmental effects estimated for this project consider the site-specific effects of all foreseeable actions and mitigation measures. Monitoring during and following implementation of the project would occur to verify effectiveness of mitigation measures and predictions of impact. This EA will guide any subsequent project implementation. If new information or unforeseen and unanalyzed actions become necessary in the future, additional site-specific environmental analysis will be conducted before implementation.

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## Chapter 2 – Alternatives

### INTRODUCTION

The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development (DO-13, NPS Management Policies 2001). The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The action alternatives subscribe to and support the practice of sustainable planning, design, and human use of the Park's developed areas with its associated public and administrative facilities.

This document analyzes the No-Action Alternative and two action alternatives. Analysis of the No-Action Alternative is required under NEPA (40 CFR 1502.14(d)). It provides a baseline for assessing the potential impacts of the Proposed Action and the other action alternatives. In developing alternatives for this project some actions were considered and subsequently dismissed. A description of alternatives considered but dismissed from detailed study is included in this chapter. A summary table comparing alternative components is also presented at the end of this chapter.

The preferred alternative is based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the alternative are only estimates and could change during final site design. If changes during final site design are not consistent with the intent and effects of the selected alternative, then additional compliance would be conducted as appropriate.

### ALTERNATIVE DEVELOPMENT

Many of the restrooms included in this proposal for rehabilitation or replacement are straightforward actions that did not require extensive alternative generation. Many of the restroom locations included in this proposal are existing restrooms that would be replaced with prefabricated vault toilets or propose rehabilitation of existing structures. Other discussions of alternate designs or site layouts took place during pre-design reviews with park staff and field visits, as described in the next section.

### ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED STUDY

Hermits Rest – A preliminary proposal included demolition of the existing building and construction of a new single building with multiple vault units on the same footprint. This was subsequently determined to be too costly and it had the potential for adverse impacts to the nearby National Historic Landmark building. Four individual two-stall vaults units were then considered, instead of a single building, in various configurations on the existing site.

Yavapai Observation Station – A preliminary proposal included demolition of the existing building and construction of a larger 12-stall restroom on the same site. It was subsequently determined that, while an expansion was necessary, it could be accommodated with rehabilitation of the existing

building and reconfiguration of existing space, with a minor expansion of the building's footprint. Demolition and a full rebuild were determined not to be necessary.

Hopi Point – A preliminary proposal included replacement of the existing chemical toilet with a vault toilet at the same location, near the shuttle bus stop. It was subsequently determined that a location closer to the overlook and away from the shuttle bus stop, where there is limited space and potential for conflicts with the shuttle buses, would be more appropriate location for the toilet. NPS also considered constructing the vault in the parking area to avoid disturbance to the island and minimize the need for curb cuts. This was dismissed due to the fact that a site within the island would be more conducive to the site and the cultural landscape, and it was determined that the island could still be used without the need for tree removal.

South Kaibab Trailhead – A preliminary proposal included replacement of the existing chemical toilets with a vault toilet constructed near the mule corral where there is more soil and topographic relief. This site was subsequently rejected due to proximity to historic structures, inadequate service access and the potential for special status species issues.

Grandview Point – A preliminary proposal included replacement of the two existing chemical toilets with a two-stall vault and a one-stall vault. It was subsequently determined that the visitor demand at this site is being met with two toilets now and there is not a need to have three stalls here. This would allow the construction of one relatively small building versus two separate structures, as initially proposed. Another preliminary proposal included construction of the new vaults along a pathway within the existing island. This was subsequently rejected due to the difficulty in accessing the vaults during servicing trips, the potential for social trailing and disturbance to existing revegetation efforts in this area.

Shoshone Point – A preliminary proposal to construct the vault toilet further down the road and away from the picnic area was considered in order to avoid disturbance to extensive archeological sites in the area. This location, while it would not require costly site excavation and data recovery, would not adequately address the need for a restroom at this popular picnic site. The restroom would be too far from the parking area and picnic area. For these reasons, this option was rejected.

Three Mile – A preliminary proposal to use above-ground vault toilets (the type in use at several backcountry toilet locations) at Three Mile was developed but subsequently dismissed from detailed analysis. While installation of above-ground vaults would not require ground disturbance, would be unobtrusive, are relatively inexpensive and would be able to be flown in with just one or two helicopter flights, they were determined not suitable for this site. Due to the high volume of use at this popular day hiking destination along the Bright Angel Trail, above-ground vaults (approximately 95 gallon capacity each) would simply not have enough capacity for the demand. These units would not have the ability to compost waste at all, with the level of use they are expected to receive, and would fill up very quickly. This would require NPS personnel to service them on an almost daily basis; an unrealistic goal considering the remoteness of the site and the weight of essentially non-composted waste needing to be hauled out of the inner canyon.

Two different locations were also preliminarily discussed for the proposed composting toilet; the first is a site immediately north of the rest house, on the upslope side that would require new ground disturbance. While this location would be more visible from the rest house and from the trail, it would require new ground disturbance and would likely require blasting or other difficult site excavation, due to the rockiness and steepness of the terrain. This site would also pose a problem during periodic empty/removal trips by mule; there is essentially no room for safely hitching a mule string in this area during maintenance and would likely result in conflicts between visitors and livestock. The second site preliminarily considered is further east of the proposed location under Alternatives B and C,



approximately twice the distance from the rest house, or approximately 60 – 80 yards from the rest house. This site was considered to reduce the potential for conflicts between visitors using the toilet and the nearby emergency helicopter landing area. While this location is farther from the landing area than the site proposed under Alternatives B and C, it still requires that visitors walk past the landing area to access it from the rest house. This site is also almost twice as far from the rest house and the Bright Angel Trail as the proposed location, making it more difficult to find and use. For these reasons, these two sites were dismissed from further detailed analysis.

Pipe Creek – Similar to Three Mile, a preliminary proposal to use above-ground vault toilets (the type in use at several backcountry toilet locations) at Pipe Creek was developed but subsequently dismissed from detailed analysis. While installation of above-ground vaults would not require ground disturbance, would be unobtrusive, are relatively inexpensive and would be able to be flown in with a just one or two helicopter flights, they were determined not suitable for this site. If any type of toilet is installed at this location, it is expected to be used frequently by those on river exchanges, day hikers and backpackers using the corridor trails. Due to the high volume of use projected, above-ground vaults (approximately 95 gallon capacity each) would simply not have enough capacity for the demand. These units would not have the ability to compost waste at all, with the level of use they are expected to receive, and would fill up very quickly. This would require NPS personnel to service them on an almost daily basis; an unrealistic goal considering the remoteness of the site and the weight of essentially non-composted waste needing to be hauled out of the inner canyon. Likewise, a larger two-stall composting unit was preliminarily discussed for installation at this site. While a larger two-stall toilet may potentially reduce the cyclic maintenance needs and periodic empty/removal needs over the preferred alternative (a one-stall composting unit) it was determined that the physical limitations of the site (adjacent to a perennial stream), the nearness of the historic rest house, and the need to sensitively and carefully place a new structure in this cultural landscape precluded the detailed consideration of a larger building that would be substantially more difficult to sight appropriately.

To further minimize the potential for impact of a new structure near the historic rest house, several different locations were also preliminarily discussed. A site along the River Trail between the Colorado River and Pipe Creek rest house and a site along the Bright Angel Trail between Indian Garden and Pipe Creek rest house were considered. No suitable sites for a composting toilet were found during a field inspection of this stretch of the River Trail in June 2004. A location further up the Bright Angel Trail from Pipe Creek was considered but dismissed due to the knowledge that a location far removed from the rest house would likely not achieve the purpose and need for action. While any toilet along the Bright Angel Trail would likely get used if built, it was concluded that visitors would still expect one at the rest house and would continue to use the surrounding terrain at the rest house, causing unsanitary conditions in this area and damage to the historic structure. This stretch of the Bright Angel Trail between Indian Garden and Pipe Creek is one of the more pristine stretches of this corridor trail and sensitively locating a toilet in this area would be difficult. In addition, any composting facility needs access to water for cyclic maintenance and cleaning. If a toilet was proposed further up the trail, access to water would be difficult and would require tapping into the transcanyon pipeline, likely requiring even a longer distance for trenching than that described under Alternative B.

A third potential site at Pipe Creek beach, downstream from the rest house was also considered. While this location would be closer to the transcanyon pipeline and allow for an easier connection for potable water, it would construct a new building in view of the river corridor. The structure would also be within the 100-year floodplain of the Colorado River. While it would minimize the visual impact of a new structure at the rest house, it creates new visual intrusion along the river. For these reasons, these three options were dismissed from further detailed analysis.

The alternatives selected for detailed analysis were those alternatives considered important to the decision being made and those that best represented the full range of possible environmental consequences, while still meeting the purpose and need for the action and the project objectives. Alternatives considered for detailed analysis are presented in the next section.

## ALTERNATIVE DESCRIPTION

Alternatives are described below. Table 4 summarizes the primary components of each alternative and Table 5 summarizes the expected impacts from implementation of the alternatives.

### ALTERNATIVE A – NO ACTION

This alternative is summarized in Table 3. Alternative A does not meet the purpose and need for the project, but provides a basis for comparison with the action alternatives. Alternative A would maintain the existing restroom conditions in the park.

Table 3. Existing conditions of restrooms proposed for replacement, rehabilitation or installation, Grand Canyon National Park.

| Site Name                              | Existing Condition   |
|--|--|
| <b>South Rim</b>                       |  |
| Hermits Rest                           | 8-stall chemical unit comfort station and several portable toilets |
| Hopi Point Overlook                    | 2 chemical portable toilets  |
| Yavapai Observation Station            | 8-stall flush comfort station                                      |
| South Kaibab Trailhead                 | 2 chemical portable toilets  |
| Yaki Point                             | 1 chemical portable toilet   |
| Yaki Picnic Area                       | No toilet  |
| Shoshone Point                         | 2 chemical portable toilets  |
| Grandview Trailhead                    | 2 chemical portable toilets  |
| Buggeln Hill picnic area               | 1 chemical portable toilet   |
| Tusayan Museum                         | 4 chemical portable toilets  |
| <b>Desert View</b>                     |  |
| Desert View campground                 | 13-stall flush comfort station                                     |
| <b>Cross Canyon Corridor</b>           |  |
| Three Mile                             | No restroom; rest house and potable water                          |
| Indian Garden, in the upper campground | 3-stall composting toilet  |
| Pipe Creek                             | No restroom and no potable water; rest house                       |
| Phantom Ranch                          | Flush comfort station  |
| Bright Angel campground                | Flush comfort station  |
| <b>North Rim</b>                       |  |
| North Kaibab Trailhead                 | 1 chemical portable toilet   |
| Widforss Trailhead                     | 1 chemical portable toilet   |

Under the no action alternative, no improvements would be made at the 18 sites included in this proposal. Appendix C contains photos of the existing restrooms at each site. Existing comfort stations at Hermits Rest, Yavapai Observation Station, Desert View campground, Phantom Ranch, Bright Angel Campground and Indian Garden would not be rehabilitated. Temporary chemical toilets in use at Hopi Point Overlook, South Kaibab Trailhead, Yaki Point, Shoshone Point, Grandview

Trailhead, Buggeln Hill picnic area, Tusayan Museum, North Kaibab Trailhead and Widforss Trailhead would not be replaced with larger capacity vault toilets. No toilet would be installed at Three Mile, Pipe Creek or Yaki Point picnic area. No potable water source would be developed at Pipe Creek. Table 3 includes the sites, their location and their existing condition, which would remain under implementation of the no action alternative. These restrooms would continue to provide substandard facilities for park visitors and require frequent maintenance.

The No Action alternative provides a basis for comparing the management direction and environmental consequences of the other action alternatives. If the no action alternative were selected, NPS would respond to future needs related to restrooms without major actions or changes in course.

## **ALTERNATIVE B – PREFERRED ALTERNATIVE**

This alternative is summarized in Table 4. Alternative B proposes rehabilitation of five existing restrooms, replacement of existing chemical toilets with vault toilets at ten sites, installation of one new vault toilet at a site with no existing restroom, and construction of two new composting toilets along the Bright Angel Trail.

**I. Comfort Station Rehabilitation** – Yavapai Observation Station restroom is a Mission 66 comfort station (see Chapter 3, Cultural Resources, for a description of Mission 66 architecture) that would be rehabilitated. Phantom Ranch restroom (built in 1981), Bright Angel Campground restroom (built in 1981), Desert View campground (built in 1984) and Indian Garden composting toilet (built around 1987) are also in need of upgrading and repair.

- Yavapai Observation Station – The existing restroom (Appendix C - Photo 1) would be extensively rehabilitated and expanded on the north side of the building (an addition to the building of approximately 8 feet) to provide 6 toilet stalls for each of the men's and women's restrooms (an increase of two toilet stalls per side). Interior rehabilitation actions would include new plumbing drains and fixtures, new electrical, new heating and ventilation system, new interior finishes, and new toilet partitions. Exterior rehabilitation would include removal of the existing roof and replacement with a new corrugated weathered steel roof, new stucco wall finish, and new lighting. Site work would include replacement of existing asphalt walkways with new asphalt paving, a new water fountain and installation of a concrete seat wall. The existing pole fence surrounding the building would be dismantled on the north side during construction of the expansion and reinstalled in the same location. All work would be within previously disturbed areas and no vegetation would need to be totally removed. Substantial pruning of mature trees near the building entrance would need to occur where the trees intrude upon paths/pedestrian circulation. Tree pruning would follow the Park's pruning guidelines.
- Desert View Campground – Interior rehabilitation efforts for this comfort station (Appendix C – Photo 2) would include new wall and ceiling finishes, new epoxy floor finish, new plumbing fixtures and restroom accessories, new toilet partitions and a new heating and ventilation system. Exterior rehabilitation efforts would include new skylights, new doors and hardware and repair and repainting of roof trim and fascia. The roof would likely be replaced with a corrugated weathered steel roof. Nixalite (a deterrent to California condor roosting) would be installed on the roof.
- Phantom Ranch – Rehabilitation efforts for this restroom (Appendix C – Photo 3) would include the following actions: repair or replace roofing, replace interior surfaces with new finishes, replace plumbing fixtures with water-conserving models, and repair/refinish exterior finishes. Nixalite (a deterrent to California condor roosting) would be installed on the roof. No site work is necessary.

- Bright Angel Campground – Rehabilitation efforts for this restroom (Appendix C – Photo 4) are similar to those for the Phantom Ranch restroom and would include the following actions: repair or replace roofing, replace interior surfaces with new finishes, replace plumbing fixtures with water-conserving models, and repair/refinish exterior finishes. Nixalite (a deterrent to California condor roosting) would be installed on the roof. No site work is necessary.
- Indian Garden –The composting toilet at the upper end of the campground would be rehabilitated. Rehabilitation efforts would be relatively minor including such things as roof shingle repair, replacement of doors and plumbing fixtures.

While none of these buildings are considered eligible for the National Register of Historic Places, the specific components necessary for the rehabilitation of these five restrooms and their resulting appearance would be developed more fully among NPS staff during the design phases for this project. This group would evaluate and consider the comments received from the Arizona State Historic Preservation Office and determine the applicability of the Secretary of the Interior's Standards for the Treatment of Historic Properties, park architectural guidelines, and existing management policies, while also addressing the purpose and need for action. As discussed later in this document, Yavapai Observation Station restroom occurs near Yavapai Observation Station, a National Historic Landmark building and Phantom Ranch, Bright Angel and Indian Garden restrooms occur within the Cross Canyon Corridor Historic District. The selection of roof color and exterior facades would be carefully considered. The Assessment of Effects Form (AEF) being prepared separately for this project to evaluate potential impacts of this project to cultural resources under Section 106 of the National Historic Preservation Act, will describe necessary recommendations for each structure in more detail, in consultation with the State Historic Preservation Office.

## **II. Replacement of Existing Chemical Toilets with Vault Toilets**

Vault Toilet Type and Style. Portable chemical toilets at each of the following sites would be replaced with prefabricated vault toilet buildings. Vault units would either be single-stall or two-stall precast concrete units, depending on the site. Selected vault toilet styles would be appropriate for their location and surrounding landscape, such as a higher-sloped roof and darker color for some East Rim Drive sites and North Rim sites (Cascadian style, or something similar, Figure 2), which are in more forested areas, and a lower-sloped roof and lighter color for Hermits Rest, Hopi Point and Tusayan Museum on the South Rim (Gunnison or Tioga styles, or something similar, Figure 3) which are in more open terrain. Customization of this standard vault style (color, exterior façade, etc.) would be used at some sites, such as Hermits Rest, Hopi Point and Tusayan Museum where toilets occur near historic properties or within significant cultural landscapes. While the schematic drawings in Figures 2 and 3 are from the company CXT, the manufacturer that would be used for this project is unknown at this time. The vault toilet styles shown should be similar to those that would actually be installed, but may vary in specific detail depending on the vendor used.

Installation. The existing chemical toilets at each site would be removed and stored in a park-approved appropriate location. Vault toilet units would be prefabricated off site and brought in by vehicle. An approximately 4-foot deep pit would be dug to accommodate the vault itself. This may be done using a backhoe or similar piece of equipment. Some blasting may be necessary if the site is excessively rocky. Installation would take approximately 5 – 15 days per vault unit; site improvements may require additional time (i.e. Hopi Point would require more time to develop access paths and build masonry structures, as needed.) Staging areas, if needed, would be located near the project location in existing disturbed areas.

Figure 2. Proposed Cascadian style vault unit (from CXT manufacturers)



Figure 3. Gunnison and Tioga style vault unit (CXT manufacturers)



Maintenance. Following installation, vault units would need to be periodically serviced (pumped and cleaned). The frequency of pumping would vary by site and volume of use, but would generally be much less often than that currently required for the smaller capacity chemical toilets. It is estimated that the need to pump these toilets would be reduced by as much as 80%. Some existing chemical toilet sites such as at Hermits Rest, Hopi Point and Bright Angel Trailhead currently require almost daily pumping. Replacement of Hermits Rest and Hopi Point toilets with vault units would reduce this pumping to about once a week. For other less-visited areas, such as Buggeln Hill and Yaki Point Picnic Area, pumping would likely occur every two weeks. When the toilets need to be serviced (pumped), this would include driving a service vehicle in and pumping the waste from the vault. Pumping would occur after approximately 10,000 uses, at a minimum. It is likely that pumping would occur almost twice as often as this manufacturer-recommended usage is reached, simply to minimize smell and sanitation concerns that result more quickly in Arizona's hot and dry climate (P. Steinkopf, pers. com. 6/17/04). Maintenance vehicles would access the vaults on a service drive or path at the

back of each unit. The need for service access would be considered during the design and placement of each vault. Disturbance during servicing would be negligible, involving simply driving the vehicle behind the vault unit on previously disturbed areas.

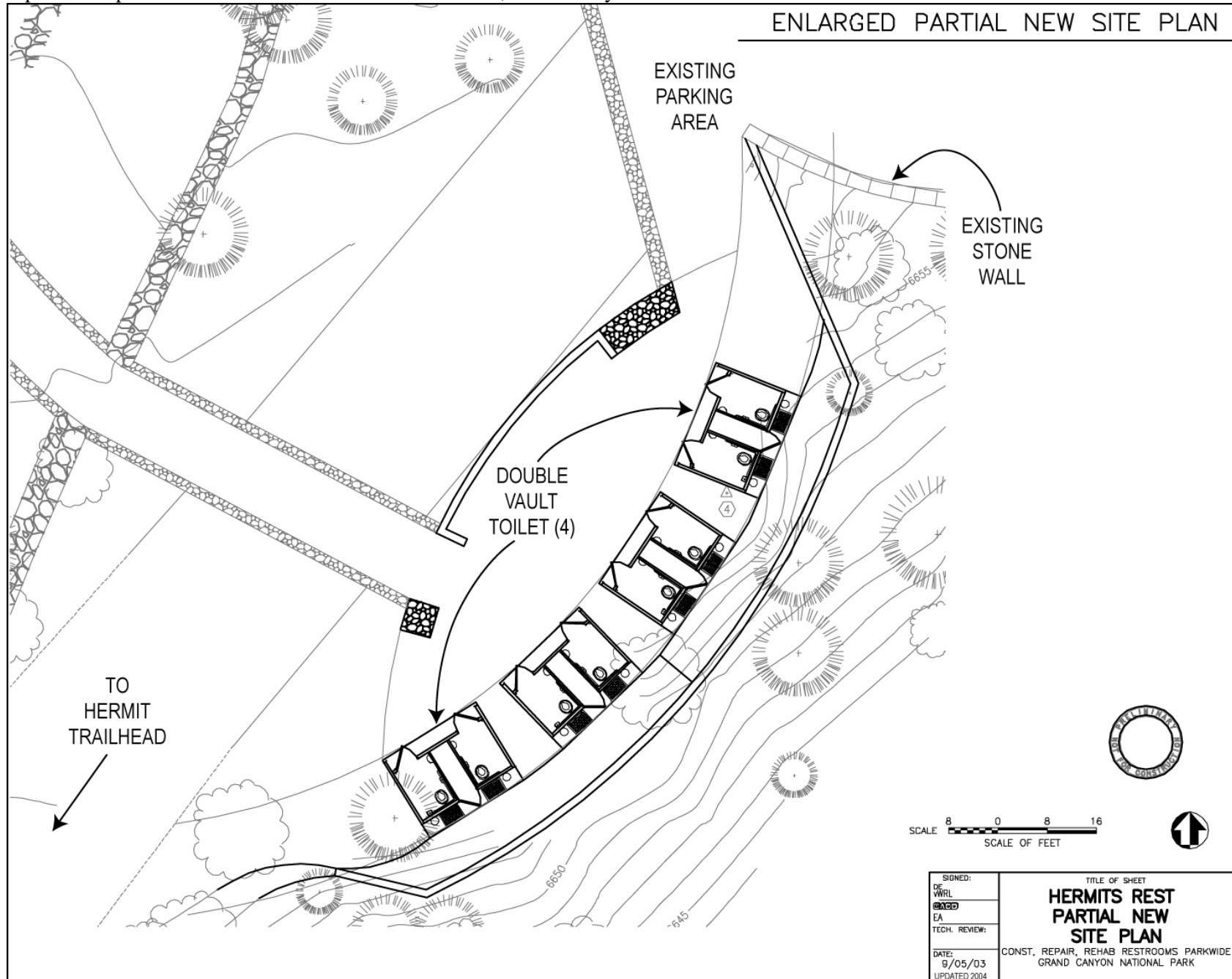
- Hermits Rest – The existing restroom building (Appendix C – Photo 5) would be demolished. This would include removal and disposal of all of the holding tanks, wood deck and the existing gate. The restroom would be replaced with four, two-stall vault toilets (Figure 5). Site work would include construction of a seven-foot tall stone masonry wall of enough length to screen the restroom and the vending machines from view from the parking area; revegetation of areas disturbed by construction, placement of a cut stone edged path to connect to existing paths, and resurfacing of asphalt walkways. All work would be within previously disturbed areas. Tree removal would be avoided as much as possible, but it is possible that up to 2 - 3 trees may need to be removed when the existing restroom is demolished, due to their proximity to the existing building. Revegetation efforts would likely be limited to seeding and mulching due to the remoteness of the site for effective shrub and tree maintenance. The restrooms would meet all current accessibility standards and would be Tioga style prefabricated vaults, or something similar (Figure 3) with a stucco finish.
- Hopi Point Overlook – The existing chemical toilets near the shuttle bus stop (Appendix C – Photo 6) would be removed. A two-stall vault toilet would be installed in the island of the parking area at the overlook (Figure 4). Site work would include new asphalt paving, new concrete paving and installation of a pedestrian crossing sign. A portion of the existing stone masonry wall would be removed to provide access to the island; minor masonry work would be required. Up to 2 – 4 small trees may need to be removed. The restroom would meet all current accessibility standards and would be a Tioga or similar style (Figure 3) prefabricated vault, possibly with stucco finish. Nixalite (a deterrent to California condor roosting) would be installed on the roof.

Figure 4. Proposed location for the Hopi Point Overlook vault toilet, Grand Canyon National Park.





Figure 5. Proposed site plan for Hermits Rest vault toilet installation, Grand Canyon National Park



- South Kaibab Trailhead – The existing chemical toilets near the parking area (Appendix C – Photo 7) would be removed. A two-stall vault toilet would be installed in the same general location, slightly further removed from the parking area than the existing toilet, but along the pathway to the trailhead (Figure 6). Site work would include some minor modification to the existing wood fence, removal of some barrier boulders and installation of asphalt walkways. All work would be within previously disturbed areas and no vegetation would need to be removed. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault. Nixalite (a deterrent to California condor roosting) would be installed on the roof.
- Yaki Point – The existing chemical toilet (Appendix C – Photo 8) would be removed. A one-stall vault toilet would be installed in essentially the same location, possibly shifted slightly to be somewhat closer to the accessible parking spaces to maximize ease of access and minimize paving. Site work would include asphalt paving and new concrete paving. All work would be within previously disturbed areas and no vegetation would be removed. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault. Nixalite (a deterrent to California condor roosting) would be installed on the roof.

Figure 6. Proposed location of South Kaibab Trailhead vault toilet installation, Grand Canyon National Park.



- Shoshone Point – The existing chemical toilets (Appendix C – Photo 9) would be removed. A one-stall vault toilet would be installed in essentially the same location; shifted slightly from the existing toilet location to avoid tree removal and to maximize southern exposure. All work would occur within previously disturbed areas. This proposed location is on top of an extensive archeological site that needs to be mitigated as part of this project, as described in the associated Assessment of actions having an Effect on cultural resources Form (AEF). The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault.



- Grandview Trailhead – The existing chemical toilets (Appendix C – Photo 10) would be removed. A two-stall vault toilet would be installed in an open area of the island immediately behind the existing chemical toilets. Site work would include concrete paving and some potential tree trimming. Specific site selection would minimize the need for tree removal. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault.
- Buggeln Hill – The existing chemical toilet (Appendix C – Photo 11) would be removed. A one-stall vault toilet would be installed in an open area near the parking lot (Figure 7). Site work includes an asphalt path to the parking area and relocation of nearby picnic tables. Although the proposed site is not disturbed, it is in a clearing adjacent to the parking area. No vegetation would be removed. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault.

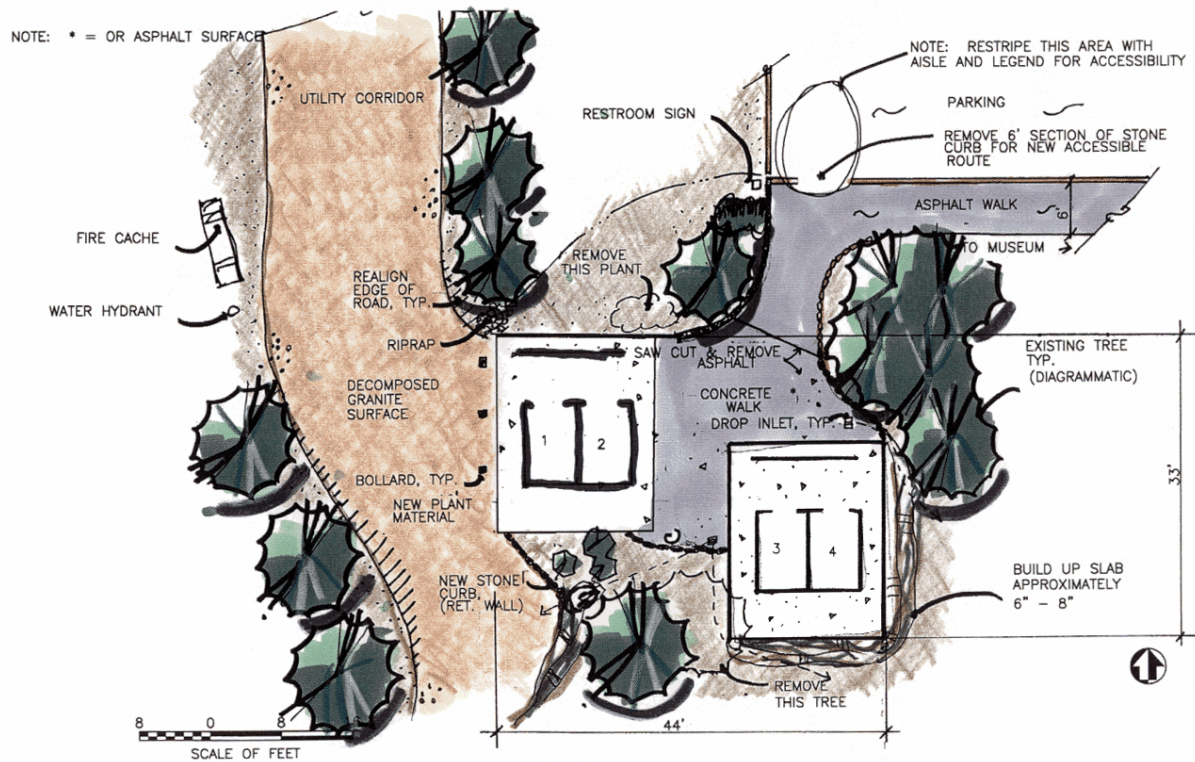
Figure 7. Proposed location of Buggeln Hill vault toilet installation, Grand Canyon National Park (2004).



- Tusayan Museum – The existing chemical toilets (Appendix C – Photo 12) would be removed. Two, two-stall vault toilets would be installed in the same general location as the existing toilets (Figure 8). Site work would include new concrete and asphalt paving, drop inlets for drainage, a small dry-laid stone retaining wall, site grading and a curb cut. While the site is essentially disturbed and adjacent to the existing toilets, some vegetation (several shrubs and up to 2 small trees) would need to be removed. The restrooms would meet all current accessibility standards and would be Tioga style (Figure 3) prefabricated vaults, with some customization for their proximity to a National Register property.
- North Kaibab Trailhead – The existing chemical toilet (Appendix C – Photo 13) would be removed. A two-stall vault toilet would be installed in the same location in the parking lot island. Site work would include filling in existing accessible parking spaces in the island with soil and designating an existing parking space as accessible,

installation of a concrete accessible ramp to the toilet and new concrete curbing and walkways. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault. Nixalite (a deterrent to California condor roosting) would be installed on the roof. A second option for location of the vault toilet may be considered; a site just north and east of the parking lot island, at the edge of the parking area. Use of this alternate area may result in the restroom being somewhat less prominent in the view from the parking area entrance. The specific location of the restroom would be selected in consultation with a landscape architect.

Figure 8. Proposed Tusayan Museum restroom site plan, Grand Canyon National Park.



- Widforss Trailhead – The existing chemical toilet (Appendix C – Photo 14) would be removed. A one-stall vault toilet would be installed at the end of the existing gravel parking area (Figure 9). Site work would include a concrete pad at the vault toilet entrance and placement of several boulders to provide a separation between parking and toilet areas. All work would be within previously disturbed areas, or directly adjacent to disturbed sites, and no vegetation would be removed. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault.

### III. Construction of New Toilets

Yaki Picnic Area – This existing picnic area along East Rim Drive (Figure 10) currently has no restroom. A one-stall vault toilet would be installed adjacent to the parking area in a small clearing (Figure 11). Site work would include a concrete pad at the vault toilet entrance. No vegetation would be removed for this project. The restroom would meet all current accessibility standards and would be a Cascadian style (Figure 2) prefabricated vault. Vault toilet type, style, installation and maintenance for this new toilet are as described under Alternative B, Section II.



Figure 9. Proposed location of Widforss Trailhead vault toilet installation, Grand Canyon National Park (2002).



Figure 10. Proposed location of new vault toilet at Yaki Picnic Area, Grand Canyon National Park.

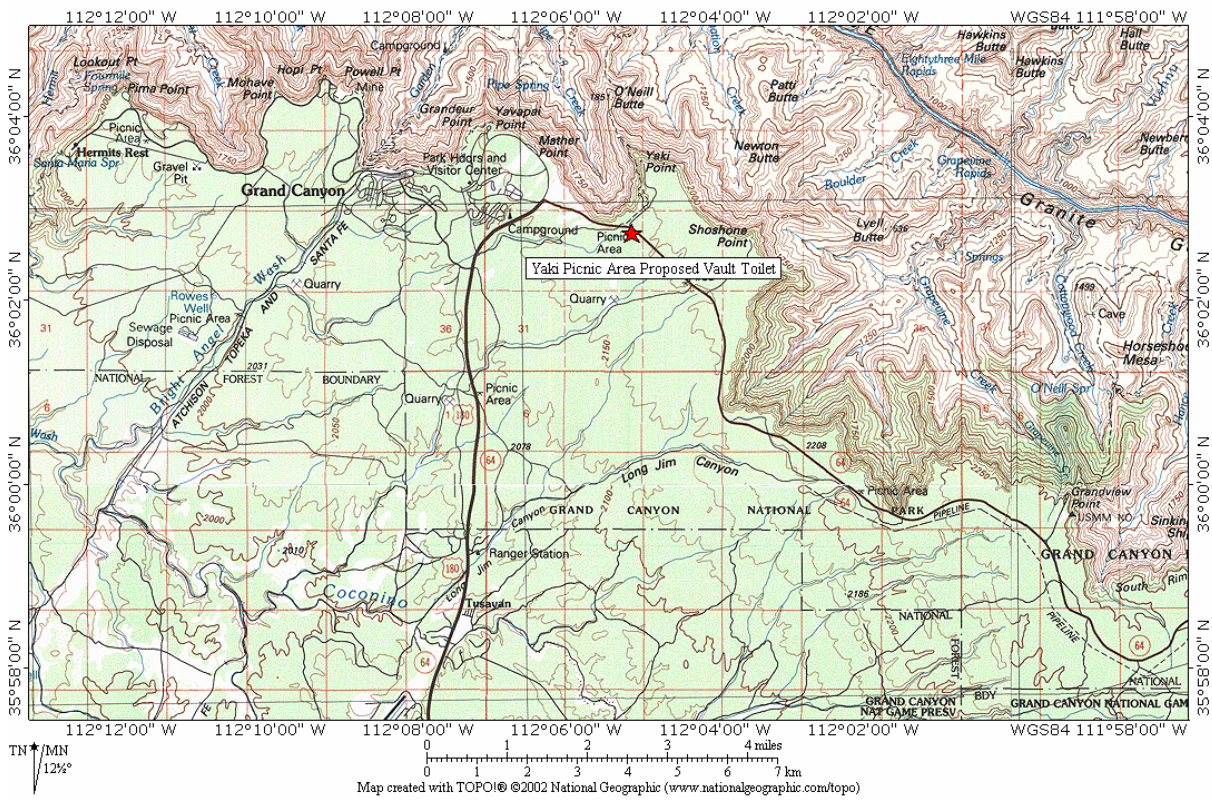




Figure 11. Proposed location of vault toilet at Yaki Picnic Area, Grand Canyon National Park (2004).



Three Mile – This site along the Bright Angel Trail (Figures 12) has an historic rest house and a place to get water, but no restroom facility. A three-stall composting toilet would be installed approximately 30 – 40 yards east of the rest house in an area once used as a borrow pit (Figure 13). The site is heavily disturbed and currently used as a storage area for trail maintenance supplies and materials. This proposed location is adjacent to an archeological site that would be mitigated as part of this project, as described in the associated Assessment of actions having an effect on cultural resources Form (AEF). The composting toilet would either be prefabricated off site, or built on site (or a combination of the two). This would be determined during later design phases for the project. An evaporator would be necessary for the toilet and would be incorporated into the design. An evaporator would require a battery-powered fan or small pump. Nixalite (a deterrent to California condor roosting) would be installed on the roof. There is an existing social trail from the rest house to the proposed toilet location that would be slightly improved and used for access.

An emergency helicopter landing area is located nearby (within approximately 100 yards) and is occasionally used for emergency medical evacuations and other emergency access in this remote area. Construction of this composting toilet in the site proposed would be implemented with the following integral mitigation measures to minimize the potential for safety concerns:

- The site plan developed for this new restroom would carefully consider the proximity of this landing area and would incorporate design features and/or other actions that would minimize safety conflicts between visitors and helicopters when this landing area is in use. NPS resource specialists (including the Inner Canyon Restoration Biologist), backcountry rangers, maintenance personnel and helicopter operations personnel would jointly develop this plan. Actions may include a Superintendent's closure order for the area east of the toilet near the landing area, additional signage, fencing or gating in certain areas, or construction of a masonry wall (appropriate for the site) to discourage visitors from entering the emergency landing area.



Figure 12. Proposed location of new composting toilet at Three Mile, along the Bright Angel Trail, Grand Canyon National Park

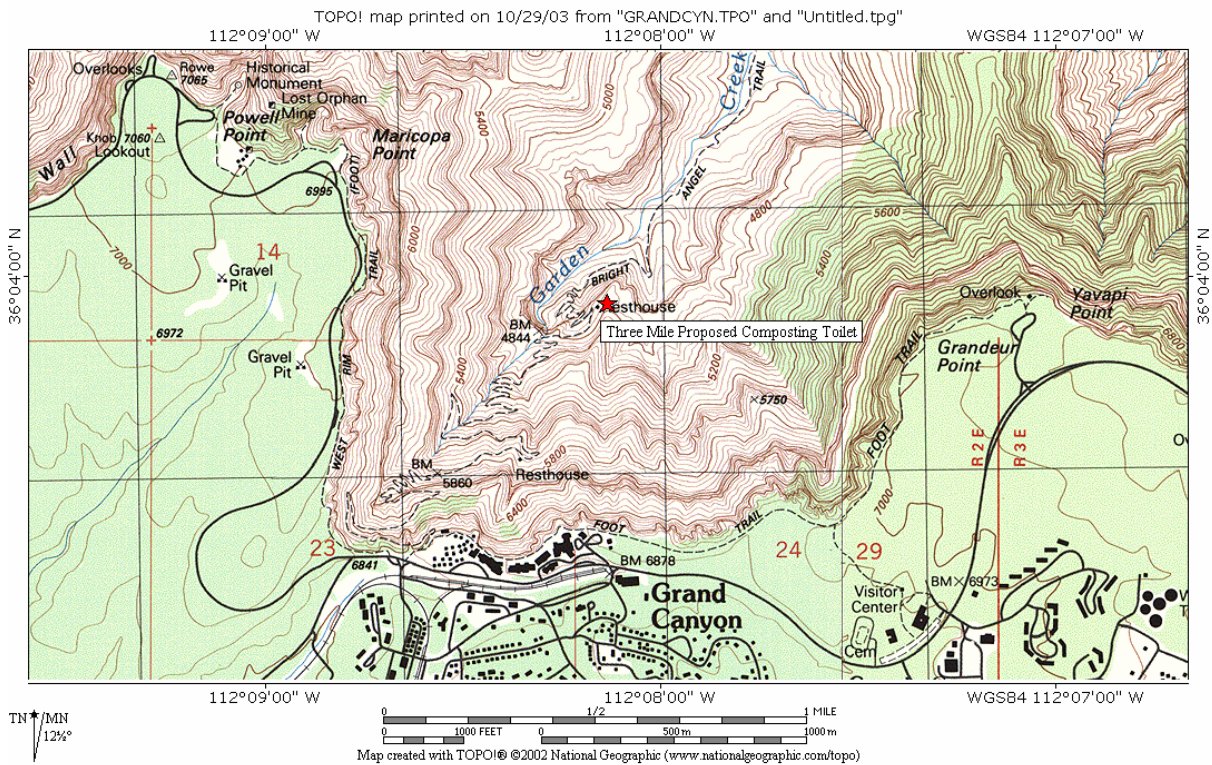


Figure 13. Proposed location of composting toilet at Three Mile, Grand Canyon National Park (2004)



**Type and style** –A Phoenix composting toilet would be installed. This system is currently in use along the Bright Angel trail at Mile and a Half, at Cedar Ridge on the South Kaibab and at Hermit Campground along the Hermit Trail. The composting toilet proposed for Three Mile would look similar to the one at Mile and a Half (Appendix C – Photo 15) but would be slightly smaller. The

three-stall composter constructed at Three Mile would be approximately 20 feet tall, 20 feet long and 10 feet wide. While some prefabrication of materials may be considered for this restroom to minimize cost, the structure would have an overall custom design utilizing native stone and other materials appropriate for its location. Design of the building is being addressed in the AEF for this project, evaluating the potential for impacts to cultural resources, including historic structures. The ultimate design of the building would be developed in consultation with the State Historic Preservation Officer.

**Construction** – Up to approximately 15 – 20 helicopter flights would be necessary to fly in materials for the construction, but would be minimized as much as possible through the use of mules or backpacking. All labor personnel would hike in to the project site and mules would be used to pack in any materials that were small enough for this type of transport (examples include mortar, hand tools,

water, etc.) Construction may take up to 9 – 12 months to fully complete, due to the remoteness of the site, availability of work crews and time involved in gathering stone and other materials (sand for mortar, etc.) necessary for construction. Staging during construction would occur on existing disturbed areas near project sites.

**Maintenance** – Due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be required to periodically empty compost from this toilet annually. It is estimated that up to 4 flights/year would be required to meet the demand. However, as also described in the mitigation measures at the end of this chapter, mules would be used instead of helicopters for this periodic compost removal if additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile and a Half. This would take approximately 5 days with 10 mules and 2 riders per year. Cyclic maintenance would occur weekly (perhaps up to 3 times per week during the busiest season) and would be conducted by personnel accessing the sites via foot or mule. Cyclic maintenance activities would include such things as adding enzymes to the toilet, stirring, site work, site cleanup and obliteration of social trailing as needed.

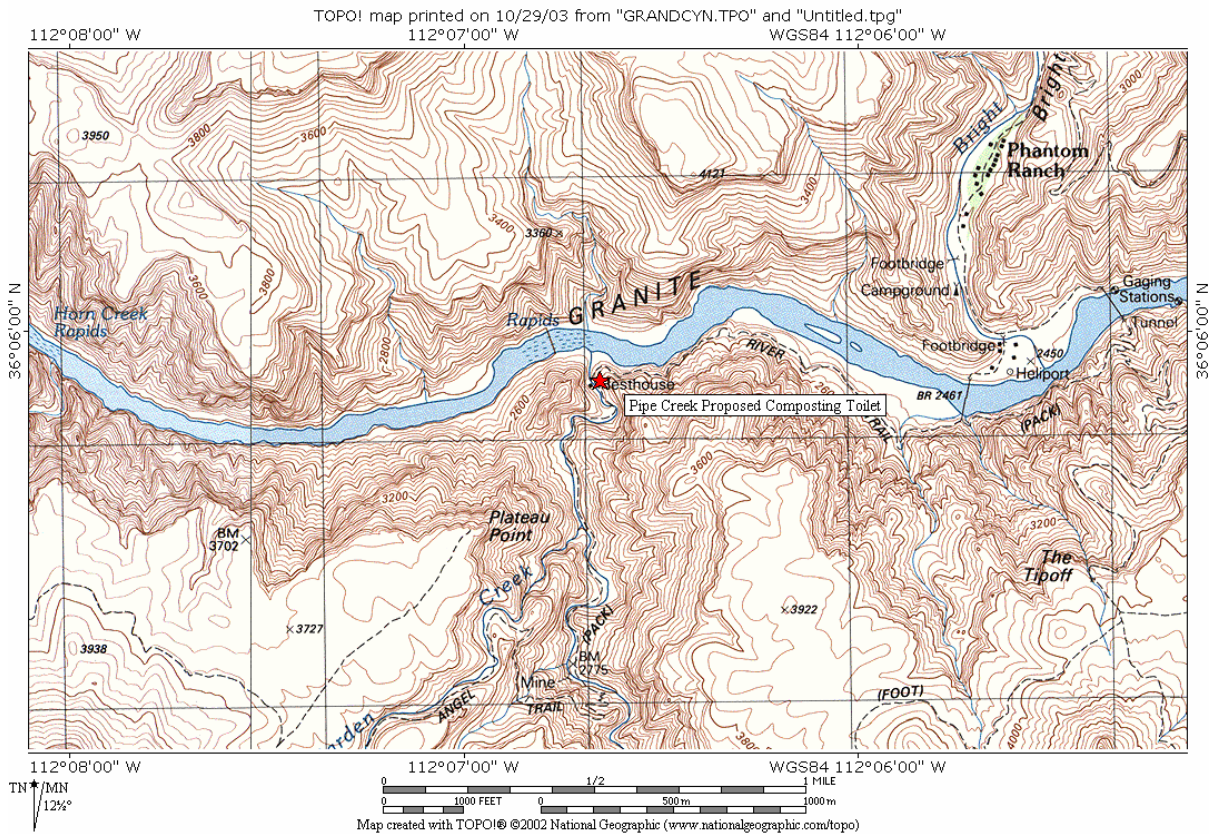
Pipe Creek - This site along the Bright Angel Trail (Figure 14) has an historic rest house, but no toilet and no potable water source. The site at one time had a drinking fountain with water from the creek, but has since been disconnected. A one-stall composting toilet, similar to that in use at Hermit Campground, would be constructed near the existing mule hitching rail, west of Pipe Creek. The exact location of the toilet would be determined by a design team (see mitigation measure below) to minimize potential impacts to the rest house and to the nearby riparian zone along Pipe Creek. Due to the limitations of the site (rockiness and the adjacent creek) options are limited, but it would likely be constructed along the rocky slope between the rest house and the creek, at least 40 feet from the rest house and tucked into the hillside (Figure 15). The area is an existing disturbed area and very rocky, so vegetation disturbance would be minimized. No riparian vegetation would be removed for toilet installation. The hitching rail may need to be relocated. If so, this would be done in consultation with the park's hydrologist to select the most appropriate new location for this use.

An evaporator would be necessary for the toilet and would be incorporated into the design. The evaporator would require a battery-powered fan or small pump, or a tie-in with the existing power line along the pipeline. Nixalite (a deterrent to California condor roosting) would be installed on the roof.

Potable water would be installed on site to provide hikers and mule riders with drinking water. This would be achieved with a connection to the transcanyon pipeline, requiring approximately 200 yards of piping from an existing valve box to the rest house. Approximately 80 yards of this distance would be exposed pipe (likely ¾ inch black pipe, or something similar) on rock faces or along the ground until the pipe could be safely buried. The trenching necessary for installation of this new pipe would



Figure 14. Proposed location of new composting toilet at Pipe Creek, along the Bright Angel Trail, Grand Canyon National Park.



be done using hand tools and/or small mechanized equipment such as a pionjar or ditching tool. The park's Inner Canyon vegetation program manager and the park's hydrologist would be consulted on the specific layout of new piping and trenching necessary for the waterline to minimize vegetation disturbance and potential impacts to Pipe Creek.

The Cross Canyon Corridor Historic District includes Bright Angel Trail and its associated trailside shelters. Pipe Creek rest house is one of these historic shelters. The rest house and the nearby Bright Angel Trail are considered significant historic resources. For this reason, a mitigation measure has been developed to minimize the potential for adverse impacts to this area. In addition, the toilet's proximity to the creek needs to be taken into consideration when selecting the placement of the toilet, the building design and the choice of materials selected. The park hydrologist will conduct an evaluation of the site prior to construction. This measure is included in the mitigation measures listed at the end of this chapter, but also repeated here:

- The selection of the specific location and building design for the Pipe Creek toilet would be carefully considered to ensure that the structure is appropriate for its location near Pipe Creek, is subordinate to the nearby historic rest house, doesn't compete with the rest house, and is compatible with the views from the Bright Angel Trail. A design team including a landscape architect, cultural resource specialist, backcountry trails and toilet maintenance representative, park hydrologist, and other park staff, as appropriate, would consider and evaluate options for location and design at the project site, prior to construction. The toilet would only be constructed if the above measures are met and the team agrees that the structure would be appropriate for its location near the creek and



would not dominate the cultural landscape. The specific site plan and design drawings would be developed in consultation with the SHPO and the park hydrologist.

Figure 15. Proposed location of composting toilet at Pipe Creek under Alternative B, Grand Canyon National Park (2004)



**Type and style** – A Phoenix composting toilet would be installed. This system is currently in use along the Bright Angel trail at Mile and a Half, at Cedar Ridge on the South Kaibab, at Tipoff and Supai Tunnel on the North Kaibab Trail, and at Hermit Campground along the Hermit Trail. The one-stall composting toilet would be similar in size to the one at Hermit Campground (Appendix C – Photo 16). A one-stall composter would be approximately 15 feet tall, 10 feet long and 12 feet wide. The toilet would be custom-designed and custom-built using native stone and other materials appropriate for its adjacency to the historic rest house. Design of the building would be as described above.

**Construction** – Up to approximately 7 – 10 helicopter flights would be necessary to fly in materials necessary for the construction, but would be minimized as much as possible through the use of mules, boats or backpacking. All labor personnel would hike from the South Rim or boat in to the project site. Mules would be used to pack in any materials that are small enough for this type of transport (examples include mortar, hand tools, water, etc.). Due to the site's proximity to the river, the feasibility of boat transport of materials would be carefully considered as an alternative to helicopter flights. Construction may take up to 9 – 12 months to fully complete, due to the remoteness of the site, availability of work crews and time involved in gathering stone and other materials (sand for mortar,



etc.) necessary for construction. Staging during construction would either occur at Phantom Ranch or on existing disturbed areas near the project site.

**Maintenance** – Due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be required to periodically empty compost from this toilet annually. It is estimated that up to 4 flights/year would be required to meet the demand. However, as also described in the mitigation measures at the end of this chapter, mules would be used instead of helicopters for this periodic compost removal if additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile and a Half. This would take approximately 7 days with 10 mules and 2 riders per year. Cyclic maintenance would occur periodically (weekly or several times a week during the busiest season) and would be conducted by personnel accessing the sites via foot, mule and/or previously scheduled river transport. Cyclic maintenance activities would include such things as adding enzymes to the toilet, stirring, site work and site cleanup.

### **ALTERNATIVE C – MINIMIZED STRUCTURE AT THREE MILE**

This alternative is the same as Alternative B except for the restroom proposal at Three Mile along the Bright Angel Trail. Alternative C proposes a smaller and more compact structure at Three Mile, constructed at the same location as that proposed under Alternative B. Because Three Mile is a remote location and adjacent to proposed wilderness, Alternative C was developed as an option that would minimize the footprint of a new structure, the amount of construction materials necessary, and the type of equipment and transport necessary over proposed wilderness. While Pipe Creek is similar to Three Mile in that it is also in a remote location along the Bright Angel corridor trail and is adjacent to proposed wilderness, the one-stall composting toilet proposed under Alternative B is the smallest-sized Phoenix composting unit available.

Primary components of Alternative C include:

**I. Comfort Station Rehabilitation** – same as Alternative B.

**II. Replacement of Existing Chemical Toilets with Vault Toilets** – same as Alternative B

**III. Construction of New Toilets**

Yaki Picnic Area – Same as Alternative B

Pipe Creek – Same as Alternative B

Three Mile - Alternative C includes installing a smaller two-stall composting toilet at the same location as proposed under Alternative B. This building would be smaller than the one proposed under Alternative B, providing two stalls instead of three stalls, and would require less overall footprint and fewer materials. This composting toilet would be approximately two-thirds the size of the one described in Alternative B. The proposed structure would be approximately 15 feet in height, 15 feet long and 8 feet wide. The description of the proposed location is as described under Alternative B. Approximately 10 – 15 helicopter flights would be necessary for transport of construction materials to the site. Alternative C includes the mitigation of the archeological site (excavation and data recovery) as described under Alternative B and the implementation of measures

to minimize the potential for visitor and helicopter conflicts during use of the nearby emergency landing area, as also described under Alternative B.

**Type and Style** – The style would be similar to that proposed under Alternative B (a Phoenix composting system) and would be either prefabricated off site or built on site (or a combination of the two), to be determined during the design phases for this project. An evaporator would be necessary for the toilet and would be incorporated into the design. While some prefabrication of materials may be considered for this restroom to minimize cost, the structure would have an overall custom design utilizing native stone and other materials appropriate for its location. Design of the building is being addressed in the AEF for this project, evaluating the potential for impacts to cultural resources, including historic structures. The ultimate design of the building would be developed in consultation with the State Historic Preservation Officer.

**Maintenance** – Due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be required to periodically empty compost from this toilet annually. It is estimated that up to 8 flights/year would be required to meet the demand. Helicopter flights may be greater than 8 flights/year due to the greater weight of raw sewage and the likelihood that the toilet may have to be emptied during hotter times of the year (end of summer) when the allowable helicopter payload decreases. However, as also described in the mitigation measures at the end of this chapter, mules would be used instead of helicopters for this periodic compost removal if additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile and a Half. Due to the smaller size of this toilet (as compared to Alternative B) and the shorter amount of time it would take to become full due to the projected volume of use, this would require more frequent cyclic maintenance and more frequent periodic compost removal, with substantially more mule traffic at this site than that proposed under Alternative B. Approximately 10 days with 10 mules and 2 riders per year would be required, or twice the projected annual maintenance needs over Alternative B. Cyclic maintenance would occur periodically (likely every other day during the busiest season) and would be conducted by personnel accessing the sites via foot or mule. Cyclic maintenance activities would include such things as adding enzymes to the toilet, stirring, site work, site cleanup and obliteration of social trailing as needed.

## IDENTIFICATION OF THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the Council on Environmental Quality (CEQ). The CEQ provides direction that “[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA’s Section 101:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life’s amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Through the process of internal scoping and scoping with the public and other agencies, the environmentally preferred alternative selected is Alternative B. Alternative B best meets the purpose and need for action and best addresses overall Park Service objectives and evaluation factors. Alternative B would result in only minimal new ground disturbance and vegetation removal and meets the purpose and need for action. The primary difference between Alternative B and C is in the slightly smaller footprint of disturbance under Alternative C and the reduced number of one-time flights into the inner canyon during the construction period. While Alternative C achieves some of the criteria above, it does not adequately plan for the quality of the visitor experience over the long-term since the capacity of the structure would be too small for future demand. This would result in more long-term recurring maintenance needs (with the likelihood of an increased number of annual helicopter flights), which does not fully achieve criteria 3, 5 or 6. Alternative B better meets these criteria. No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Alternative B is recommended as the Preferred Alternative and meets both the Purpose and Need and the project objectives.

### MITIGATION MEASURES COMMON TO ACTION ALTERNATIVES

To minimize resource impacts, the integral design features (i.e. mitigation measures) below would be followed during implementation of either of the action alternatives, and are analyzed as part of the action alternatives. These actions were developed to lessen the potential for adverse effects of the action alternatives, in combination with foreseeable future actions, and have proven to be very effective in reducing environmental impacts on previous projects.

**Contractor Orientation.** Contractors working in the Park are given orientation concerning proper conduct of operations. This orientation is provided in both written form and verbally at a preconstruction meeting. This policy would continue on proposed projects. Orientation topics would include, but not be limited to:

- Wildlife should not be approached or fed.
- Collecting any Park resources, including plants, animals, and historic or prehistoric materials, is prohibited.
- Contractor must have a safety policy and a vehicle fuel and leakage policy in place.
- For inner canyon sites, contractor must have a project manager and laborers that are able to hike in to project locations.
- Other environmental concerns and requirements discussed elsewhere in this EA would be addressed, including relevant mitigation measures listed below.

**Limitation of Area Affected.** The following mitigation measures would be implemented to minimize the area affected by construction activities.

- The staging areas for the construction office (a trailer), construction equipment, and material storage would either be located in previously disturbed areas near project sites or in other disturbed areas that best meet the needs of the project and minimizes new ground disturbance. All staging areas would be returned to pre-construction conditions once construction is complete. Standards for this, and methods for determining when the standards are met, would be developed in consultation with the Park Restoration Biologist.
- Construction zones would be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications, and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

**Soil Erosion.** To minimize soil erosion, the following mitigation measures would be incorporated into the action alternatives.

- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods would be used to minimize any potential soil erosion.
- Any trenching operations would be by rock saw, backhoe, track hoe, pionjar, ditch digger and/or trencher, with excavated material side-cast for storage. After trenching is complete, bedding material would be placed and compacted in the bottom of the trench and the utility lines installed in the bedding material. Back filling and compaction would begin immediately after the utility lines are placed into the trench, and the trench surface would be returned to pre-construction contours. All trenching restoration operations would follow guidelines approved by Park staff. Compacted soils would be scarified and original contours reestablished.
- A Salvage and Revegetation Plan would be developed for the project by a landscape architect or other qualified individual, in coordination with the Park Restoration Biologist. Any revegetation efforts would use site-adapted native species and/or native seed, and Park policies regarding revegetation and site restoration would be incorporated into the plan. The plan would consider, among other things, the use of native species, plant salvage potential, exotic vegetation and noxious weeds, and pedestrian barriers. Policy related to revegetation would be referenced in NPS Management Policies (NPS 2001b; Chapter 9).

**Vegetation.** To minimize impacts to vegetation and to prevent the introduction and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures would be incorporated into the action alternatives.

- Inventories for existing populations of exotic vegetation at construction sites would occur and any populations found would be treated prior to construction activities. For the inner-canyon sites (Three Mile and Pipe Creek) this inventory would occur concurrently with the inventory for special status plant species.
- A restoration biologist would provide input on salvage potential and tree avoidance at project sites where necessary. A restoration biologist would also spot-check the work progress, particularly at Three Mile and Pipe Creek, for adherence to mitigation measures related to vegetation.
- The park inner canyon vegetation program manager and the park hydrologist would be consulted on the specific layout of new piping and trenching necessary for the proposed waterline at Pipe Creek, to minimize vegetation disturbance and potential impacts to the riparian zone. The park hydrologist would be consulted prior to the potential relocation of the hitching rail at Pipe Creek.
- All construction equipment that would leave the road (e.g., bulldozers and backhoes) would be pressure washed prior to entering the Park.
- The location of the staging areas for construction equipment would be Park-approved and the needs for treating exotic vegetation would be considered.
- Parking of vehicles would be limited to existing roads or the staging area.
- Pruning necessary for this project and for any future periodic maintenance adjacent to any restrooms would adhere to the Park's tree pruning guidelines with the goal of retaining the health and integrity of the trees and shrubs treated.
- Any fill, rock, or additional topsoil needed would be obtained from a Park-approved source.
- All areas disturbed by construction would be revegetated using site-adapted native seed and/or plants.

**Water Quality and Floodplains.** To minimize potential impacts to water quality, the following mitigation measures would be incorporated into the action alternatives.

- The need for a storm water pollution prevention plan (SWPPP) would be evaluated, and prepared by the contractor, if necessary. This plan would be approved by the Park prior to any ground-disturbing activities. All National Pollutant Discharge Elimination System (NPDES) requirements would be met.
- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods would be used to minimize any potential sediment delivery to streams.
- Type 4 general permits will be applied for with the Arizona Department of Environmental Quality for both underground vault toilets and composting toilets included in the action alternatives. A General Permit Type 4.14 is required for vault toilet installation and a General Permit Type 4.03 is required for composting toilet installation. These permits will be approved by ADEQ prior to construction.
- The park hydrologist would conduct an on-site evaluation and floodplain assessment at Pipe Creek prior to construction. As described in the mitigation measure under cultural resources (and as also described under the alternatives section of this chapter), the park hydrologist would be an integral member of the design team formed to evaluate the specific placement, building design and building materials chosen for the proposed toilet at Pipe Creek.

**Special Status Species.** To protect any unknown or undiscovered threatened, endangered, or special status species, the construction contract would include provisions for the discovery of such. These provisions would require the cessation of construction activities until Park staff evaluates the project impact on the discovery and would allow modification of the contract for any protection measures determined necessary to protect the discovery. Mitigation measures for known special status species are as follows:

#### **California Condor**

- Prior to the start of a construction project, the Park would contact personnel monitoring California condor locations and movement within the Park to determine the locations and status of condors in or near the project area.
- If a condor occurs at the construction site, construction would cease until it leaves on its own or until permitted personnel employ techniques that result in the individual condor leaving the area.
- Construction workers and supervisors would be instructed to avoid interaction with condors and to contact the appropriate Park or Peregrine Fund personnel immediately if and when condor(s) occur at a construction site.
- The construction site would be cleaned up at the end of each day that work is being conducted (i.e., trash disposed of, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park condor staff would complete a site visit to the area to ensure adequate clean-up measures are taken.
- To prevent water contamination and potential poisoning of condors, the park-approved vehicle fluid-leakage and spill plan would be adhered to for this project. This plan would be reviewed by the Park biologist for adequacy in addressing condors for this project.
- If a new structure occurs on the rim or above tree line in other areas, there may be a need to install condor deterrent devices, such as Nixalite, on the structure. This would be evaluated on a case-by-case basis by the Park wildlife biologist.
- New construction would limit the use of “soft” and/or colorful construction materials on roofs and along building foundations to minimize the possibility of condors becoming attracted to

the building. An example of this type of material includes rubber weather-stripping which condors can pull off and ingest.

- If non-nesting condors occur within 1 mile of the project area, blasting would be postponed until condors leave or are hazed by permitted personnel.
- If condor nesting activity is known within 1 mile of the project area, then blasting activity would be restricted during the active nesting season, if viable nests persist. The active nesting season is February 1 to October 15, or until young are fully fledged. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.
- If condor nesting activity is known within 0.5 mile of the project area, then light and heavy construction in the project area would be restricted during the active nesting season, if viable nests persist. The active nesting season is February 1 to October 15, or until young are fully fledged. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.
- Helicopter flights necessary for construction at Three Mile and Pipe Creek would be evaluated for their potential impact to active nesting areas for condors in the inner canyon. Flight paths could potentially be altered so that they would not be flying within or near an active nesting area. If this is not possible, these flights would be restricted during the active nesting season, if viable nests persist. The active nesting season is February 1 to October 15, or until young are fully fledged. to the non-breeding season (September 1 – February 28). These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.

#### **Mexican Spotted Owl (MSO)**

- If a construction project occurs within a Protected Activity Center (PAC) with no known nest site, then all construction activity would be restricted to the non-breeding season (September 1 – February 28). However, if the project in a PAC is at least 0.8 km (0.5 mile) from known nest sites and the project does not include blasting, then the project can be implemented during the breeding season. The breeding season is March 1 – August 31. As of August 2004, this applies to Shoshone Pt and Buggeln Hill.
- If a construction project outside of PACs occurs within 1.6 km (1 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then all blasting in that project area would be restricted to the non-breeding season (September 1 – February 28). Blasting may be necessary for vault excavation at some sites. The park wildlife biologist would be consulted for the latest information on PACs within this 1 mile distance.
- If a construction project outside of PACs occurs within 0.8 km (0.5 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then light and heavy construction activity in that project area would be restricted to the non-breeding season (September 1 – February 28). As of August 2004, this applies to Hermits Rest, South Kaibab Trailhead, Yaki Point, Yaki Picnic Area, and Grandview. While PACs occur within 0.5 miles of Desert View Campground and maybe Indian Garden, the work at these sites classifies as interior/exterior rehabilitation (not construction) and would not require a breeding season restriction (NPS 2002 and USFWS 2002).
- Helicopter flights necessary for construction at Three Mile and Pipe Creek would be evaluated for their potential impact to MSO PACs in the inner canyon. Flights could come in from the north and avoid flying over designated PACs during the breeding season. If this is not possible, these flights would be restricted to the non-breeding season (September 1 – February 28).

**Zone-tailed Hawk**

- Occupancy of the territory near Grandview Trailhead would be confirmed by the park biologist prior to construction. If occupied, the park biologist would determine if any breeding season restriction on construction activities would be necessary.

**Niobrara Ambersnail**

- If ground-disturbing site work is identified at Indian Garden during later design phases for this project, known and potential ambersnail habitat would be identified and flagged by a NPS biologist prior to the commencement of this site work and the area would be avoided. Measures would be taken to assure that no surface disturbance or sedimentation would occur in Niobrara ambersnail habitat at Indian Garden.

**Grand Canyon Catchfly**

- Surveys for this species would be conducted at Three Mile and Pipe Creek prior to project implementation to confirm its presence/absence. For both sites combined, this would require approximately one day for one person from the vegetation program management division. If individuals of this species are located in or near proposed project areas, protective measures would be implemented, in consultation with the Park's Inner Canyon Vegetation Program Manager.

**Soundscapes and Wilderness.** To minimize the impacts of construction activities on soundscapes and wilderness, the following mitigation measures would be incorporated into the action alternatives.

- A minimum requirements analysis (MRA) will be conducted for proposed methods used to construct and maintain proposed toilets at Three Mile, Pipe Creek, Indian Garden, Phantom Ranch, Bright Angel Campground and Widforss Trailhead (Appendix F). While none of these sites are located within the boundaries of proposed wilderness, methods used to transport materials into these sites has the potential to impact adjacent proposed wilderness. The minimum tool determined necessary for these actions through the MRA process (as documented in this EA) will form the basis for the selection of transport method for each of these sites.

**Cultural Resources.** To minimize the impacts of construction activities on cultural resources, the following mitigation measures would be incorporated into the action alternatives.

- If previously unknown archeological resources are discovered during the course of the project, a park archeologist would be contacted immediately. All work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in accordance with the stipulations of the 1995 Programmatic Agreement among the National Park Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona.
- All workers would be informed of the penalties of illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures if previously unknown resources were uncovered during construction activities.
- Monitoring of the construction at Tusayan Museum and at Widforss Trailhead would be undertaken by a qualified archeologist, due to the proximity of documented archeological sites in these areas
- The specific components necessary for the rehabilitation of the Yavapai Observation Station comfort station, a Mission 66 building, and the resulting appearance of the building would be

developed more fully among NPS staff during the design phases of this project.

This group would evaluate and consider the comments previously received from the SHPO and determine the applicability of the Secretary of the Interior's Standards for the Treatment of Historic Properties, park architectural guidelines, and existing management policies, while also addressing the purpose and need for action. The restroom occurs near Yavapai Observation Station, a National Historic Landmark (NHL) building. While the restroom is located outside the NHL boundary, the proximity of this restroom to this significant building would be considered during design.

- The specific components necessary for the rehabilitation or installation of comfort stations in the cross-canyon corridor (Three Mile, Indian Garden, Phantom Ranch, Bright Angel Campground, [*Pipe Creek is discussed separately below*]) and others areas with cultural landscapes and/or that are adjacent to historic structures (Hopi Point, Hermits Rest, Tusayan Museum) and their resulting appearance would be developed more fully among NPS staff during the design phases for this project. This group would evaluate and consider comments from the Arizona State Historic Preservation Office, the Secretary of the Interior's Standards for the Treatment of Historic Properties, park architectural guidelines, and existing management policies. The selection of roof color and exterior facades would be carefully considered and would follow guidelines described in the associated AEF for this project.
- Archeological sites occur at the proposed location for the Three Mile and Shoshone Point restrooms and would be mitigated as part of this project. A mitigation/data recovery plan for each site would be developed in consultation with the SHPO and affiliated Native American groups.
- The selection of the specific location and building design for the Pipe Creek toilet would be carefully considered to ensure that the structure is appropriate for its location near Pipe Creek, is subordinate to the nearby historic rest house, doesn't compete with the rest house, and is compatible with the views from the Bright Angel Trail. A design team including a landscape architect, cultural resource specialist, backcountry trails and toilet maintenance representative, park hydrologist, and other park staff, as appropriate, would consider and evaluate options for location and design at the project site, prior to construction. The toilet would only be constructed if the above measures are met and the team agrees that the structure would be appropriate for its location near the creek and would not dominate the cultural landscape. The specific site plan and design drawings would be developed in consultation with the SHPO and the park hydrologist.

**Visual Resources.** To minimize visual impacts, mitigation measures would include the following:

- Natural, muted colors, that replicate existing location hues, would be used to blend any built materials into the landscape.
- Restroom structures would be sited so that they do not compete with views and vistas and are incorporated into the surrounding landscape.

**Visitor Experience.** The following mitigation measures would be incorporated into the action alternatives to minimize the impacts of construction activities on the visitor experience:

- Construction activities would be restricted during peak use days such as holidays and some weekends during the busiest times of the year to minimize disruption to visitors.
- Traffic in any one direction would not be stopped for more than 15 minutes to minimize disruption to traffic flow.
- Unless otherwise approved by the Park, operation of heavy construction equipment and helicopters would be restricted to 8:00 am to 6:00 pm in the summer (May 1- September 30) and to 9:00 am to 5:00 pm during the rest of the year.



- The Yavapai restroom would be closed during rehabilitation but this closure would correspond with the closure of the observation station during its rehabilitation (see Appendix E). Portable chemical toilets would be supplied at Desert View campground and Hermits Rest during construction.
- As time and funding allows, information regarding implementation of this project and other foreseeable future projects would be shared with the public upon their entry into the park during construction periods. This may take the form of an informational brochure or flyer about the projects distributed at the gate and sent to those with reservations at park facilities, postings on the park's website, press releases, and/or other methods. The purpose of these efforts would be to minimize the potential for negative impacts to the visitor experience during implementation of this project and other planned projects during the same construction season.
- Information regarding construction of the toilets at Pipe Creek and Three Mile and the purpose for the project would be distributed to backcountry users at the corridor trailheads.

**Park Operations and Safety.** The following mitigation measures would be incorporated into the action alternatives to minimize the impacts of proposed activities on park operations and to minimize safety risks to employees and visitors:

- As described under Alternatives B and C, the site plan developed for the proposed toilet at Three Mile along the Bright Angel Trail would carefully consider the proximity of the emergency helicopter landing area and would incorporate design features and/or other actions that would minimize safety conflicts between visitors and helicopters when this landing area is in use. NPS resource specialists, maintenance personnel and helicopter operations personnel would jointly develop this plan. Actions may include a Superintendent's closure order for the area east of the toilet near the landing area, additional signage, fencing or gating in certain areas, or construction of a masonry wall (appropriate for the site) to discourage visitors from entering the emergency landing area.
- Due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be used to periodically empty compost from the proposed toilets at Three Mile and Pipe Creek annually. However, as also described in the description of maintenance needs under the action alternatives, mules would be used instead of helicopters for this periodic compost removal IF additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile and a Half.

**Air Quality.** Air quality impacts of the action alternatives are expected to be temporary and localized. To minimize these impacts, the following actions would be taken:

- To reduce entrainment of fine particles from hauling material, sufficient freeboard would be maintained and loose material loads (aggregate, soils, etc.) would be tarped.
- To reduce tailpipe emissions, construction equipment would not be left idling any longer than is necessary for safety and mechanical reasons.
- To reduce construction dust in the short term, water would be applied to problem areas. Equipment would be limited to the fenced project area to minimize soil disturbance and consequent dust generation.
- Landscaping and revegetation would control long-term soil dust production. Mulch and the plants themselves would stabilize the soil and reduce wind speed/shear against the ground surface.

**Alternatives and Project Objectives:** The objectives of the action are described in Chapter 1 and also listed here: 1) Provide adequately-sized restroom facilities to meet current and anticipated future visitor demand and that maximize the length of time between maintenance trips; 2) Provide clean, functional and serviceable restroom facilities that implement the concepts of sustainable facility design and that are aesthetically pleasing and appropriate for their location within Grand Canyon National Park; and 3) Minimize new ground disturbance and tree removal.

The preferred alternative clearly addresses each of these objectives. Alternatives that were considered but dismissed from further analysis were dismissed in part because they did not sufficiently address one or all of these project objectives. Alternative C does not meet objectives 1 and 2 as fully as Alternative B due to the smaller size of the composting toilet proposed at Three Mile. Table 4 displays alternative components and compares the ability of the alternatives to meet project objectives.

Table 4. Proposed action for restroom replacement, rehabilitation or installation under Alternative B, Grand Canyon National Park.

| Alternative A – No Action   |                                       | Alternative B - Preferred |  |   |  | Alternative C – Minimized Structure at Three Mile |                       |                       |  |
|-----------------------------|---------------------------------------|---------------------------|--|---|--|---|-----------------------|-----------------------|--|
| Site Name                   | Existing                              | Action Category           | Proposed Action  | Maintenance (Pumping or periodic empty/removal) | Approximate ground disturbance adjacent to disturbed areas (acres)     | Action Category                                   | Proposed Action       | Maintenance           | Approximate new ground disturbance (acres) |
| <b>South Rim</b>            |                                       |                           |  |   |  |   |                       |                       |  |
| Hermits Rest                | 8-stall chemical unit comfort station | Replacement               | Remove existing and replace with four 2-stall vault toilets. Tioga-style or similar vaults | Approximately once per week                     | 0.25 acres; up to 2-4 trees removed                                    | Replacement                                       | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |
| Hopi Point Overlook         | 2 chemical portable toilets           | Replacement               | Replace existing portable toilets with 2-stall Tioga-style or similar vault toilet         | Approximately once per week                     | 0.10 acres in existing parking area island; up to 2-4 trees removed    | Replacement                                       | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |
| Yavapai Observation Station | 8-stall flush comfort station         | Rehabilitate and Expand   | Rehabilitate and expand existing flush comfort station to 12 stalls total.                 | Daily cleaning                                  | 0.10 acres within existing fenced area; no tree removal (pruning only) | Rehabilitate and Expand                           | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |

|                           |                                   | Alternative<br>A – No<br>Action | Alternative<br>B - Preferred   |   |   | Alternative<br>C –<br>Minimized<br>Structure at<br>Three Mile |                          |                          |   |
|---------------------------|-----------------------------------|---------------------------------|--|---|---|---|--------------------------|--------------------------|---|
| Site Name                 | Existing                          | Action<br>Category              | Proposed<br>Action   | Maintenance<br>(Pumping or<br>periodic<br>empty/removal | Approximate<br>ground<br>disturbance<br>adjacent to<br>disturbed<br>areas (acres) | Action<br>Category  | Proposed<br>Action       | Maintenance              | Approximate<br>new ground<br>disturbance<br>(acres) |
| South Kaibab<br>Trailhead | 2 chemical<br>portable<br>toilets | Replacement                     | Replace<br>existing<br>chemical<br>portable<br>toilets with 2-<br>stall<br>Cascadian<br>vault toilet.          | Approximately<br>once per week                          | 0.10 acres, no<br>tree removal  | Replacement   | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |
| Yaki Point                | 1 chemical<br>portable<br>toilet  | Replacement                     | Replace<br>existing<br>chemical<br>portable toilet<br>with 1-stall<br>Cascadian<br>vault toilet.               | Approximately<br>once every two<br>weeks                | 0.10 acres, no<br>tree removal  | Replacement   | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |
| Shoshone Point            | 2 chemical<br>portable<br>toilets | Replacement                     | Replace<br>existing<br>chemical<br>portable<br>toilets with 1-<br>stall<br>Cascadian-<br>style vault<br>toilet | As needed,<br>depending on<br>site<br>reservations      | 0.10 acres; no<br>trees removed   | Replacement   | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |



| Alternative A – No Action |                             | Alternative B - Preferred |   |   |  | Alternative C – Minimized Structure at Three Mile |                       |                       |  |
|---------------------------|-----------------------------|---------------------------|---|---|--|---|-----------------------|-----------------------|--|
| Site Name                 | Existing                    | Action Category           | Proposed Action   | Maintenance (Pumping or periodic empty/removal) | Approximate ground disturbance adjacent to disturbed areas (acres) | Action Category                                   | Proposed Action       | Maintenance           | Approximate new ground disturbance (acres) |
| Grandview Trailhead       | 2 chemical portable toilets | Replacement               | Replace existing chemical portable toilets with a 2-stall Cascadian vault toilet      | Approximately once every 2-3 weeks              | 0.10 acres, 0 – 2 trees removed                                    | Replacement                                       | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |
| Yaki picnic area          | No toilet                   | New Installation          | Install a 1-stall Cascadian vault toilet.   | Approximately once every two weeks              | 0.10 acres; no tree removal  | New Installation                                  | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |
| Buggeln Hill picnic area  | 1 chemical portable toilet  | Replacement               | Replace existing chemical portable toilet with a 1-stall Cascadian-style vault toilet | Approximately once every two weeks              | 0.10 acres, no tree removal  | Replacement                                       | Same as Alternative B | Same as Alternative B | Same as Alternative B                      |

|                           |   | Alternative<br>A – No<br>Action | Alternative<br>B - Preferred  |   |   | Alternative<br>C –<br>Minimized<br>Structure at<br>Three Mile |                          |                          |   |
|---------------------------|---|---------------------------------|---|---|---|---|--------------------------|--------------------------|---|
| Site Name                 | Existing                                | Action<br>Category              | Proposed<br>Action  | Maintenance<br>(Pumping or<br>periodic<br>empty/removal | Approximate<br>ground<br>disturbance<br>adjacent to<br>disturbed<br>areas (acres) | Action<br>Category  | Proposed<br>Action       | Maintenance              | Approximate<br>new ground<br>disturbance<br>(acres) |
| Tusayan Museum            | 4 chemical<br>portable<br>toilets       | Replacement                     | Replace<br>existing<br>chemical<br>portable<br>toilets with<br>two, 2-stall<br>Tioga-style<br>vault toilets,<br>with some<br>customization. | Approximately<br>once per week                          | 0.25 acres; 1-3<br>trees removed  | Replacement   | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |
| <b>Desert View</b>        |   |                                 |   |   |   |   |                          |                          |   |
| Desert View<br>campground | 13-stall<br>flush<br>comfort<br>station | Rehabilitation                  | Rehabilitate<br>existing flush<br>comfort<br>station  | Daily cleaning  | None  | Rehabilitation  | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |

|   |   | Alternative<br>A – No<br>Action | Alternative<br>B - Preferred   |   |   | Alternative<br>C –<br>Minimized<br>Structure at<br>Three Mile |   |   |   |
|---|---|---------------------------------|--|---|---|---|---|---|---|
| Site Name   | Existing  | Action<br>Category              | Proposed<br>Action   | Maintenance<br>(Pumping or<br>periodic<br>empty/removal                             | Approximate<br>ground<br>disturbance<br>adjacent to<br>disturbed<br>areas (acres)   | Action<br>Category  | Proposed<br>Action  | Maintenance   | Approximate<br>new ground<br>disturbance<br>(acres) |
| <b>Inner Canyon –<br/>Cross Canyon<br/>Corridor</b> |   |                                 |  |   |   |   |   |   |   |
| Three Mile  | No toilet   | New<br>Installation             | Construct a 3-<br>stall<br>composting<br>toilet; up to 15<br>– 20 flights<br>needed  | 4 flights/year<br>(mules may be<br>used eventually<br>if staffing is<br>increased)  | 0.25 acres<br>including<br>toilet and trail<br>improvements,<br>no trees<br>removed | New<br>Installation   | Construct a 2-<br>stall<br>composting<br>toilet; up to<br>10 – 15 flights<br>needed | 8 flights/year<br>(mules may<br>be used<br>eventually if<br>staffing is<br>increased) | 0.10 acres; no<br>trees removed                     |
| Indian Garden                                       | 3-stall<br>composting<br>toilet in<br>upper<br>campground | Rehabilitation                  | Rehabilitate<br>existing<br>composting<br>toilets; no<br>flights needed  | 10 days with 10<br>mules and 2-3<br>riders per year<br>(or up to 6<br>flights/year) | None  | Rehabilitation  | Same as<br>Alternative B  | Same as<br>Alternative B  | Same as<br>Alternative B                            |
| Pipe Creek  | No toilet   | New<br>Installation             | Construct a 1-<br>stall<br>composting<br>toilet and<br>reinstall<br>potable water<br>source; up to<br>7 – 10 flights<br>needed | 4 flights/year<br>(mules may be<br>used eventually<br>if staffing is<br>increased)  | 0.25 acres, no<br>trees removed   | New<br>Installation   | Same as<br>Alternative B  | Same as<br>Alternative B  | Same as<br>Alternative B                            |

|                            |                                  | Alternative<br>A – No<br>Action | Alternative<br>B - Preferred  |   |   | Alternative<br>C –<br>Minimized<br>Structure at<br>Three Mile |                          |                          |   |
|----------------------------|----------------------------------|---------------------------------|---|---|---|---|--------------------------|--------------------------|---|
| Site Name                  | Existing                         | Action<br>Category              | Proposed<br>Action  | Maintenance<br>(Pumping or<br>periodic<br>empty/removal | Approximate<br>ground<br>disturbance<br>adjacent to<br>disturbed<br>areas (acres) | Action<br>Category  | Proposed<br>Action       | Maintenance              | Approximate<br>new ground<br>disturbance<br>(acres) |
| Phantom Ranch              | Flush<br>comfort<br>station      | Rehabilitation                  | Rehabilitate<br>existing flush<br>comfort<br>station; no<br>flights needed                      | Daily cleaning  | None  | Rehabilitation  | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |
| Bright Angel<br>campground | Flush<br>comfort<br>station      | Rehabilitation                  | Rehabilitate<br>existing flush<br>comfort<br>station; no<br>flights needed                      | Daily cleaning  | None  | Rehabilitation  | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |
| <b>North Rim</b>           |                                  |                                 |   |   |   |   |                          |                          |   |
| North Kaibab<br>Trailhead  | 1 chemical<br>portable<br>toilet | Replacement                     | Replace<br>existing<br>portable toilet<br>with a 1-stall<br>Cascadian-<br>style vault<br>toilet | Approximately<br>once per week                          | None; no trees<br>removed   | Replacement   | Same as<br>Alternative B | Same as<br>Alternative B | Same as<br>Alternative B                            |



|  |                                  | Alternative<br>A – No<br>Action               | Alternative<br>B - Preferred  |   |   | Alternative<br>C –<br>Minimized<br>Structure at<br>Three Mile |  |  |  |
|--|----------------------------------|---|---|---|---|---|--|--|--|
| Site Name                                      | Existing                         | Action<br>Category                            | Proposed<br>Action  | Maintenance<br>(Pumping or<br>periodic<br>empty/removal   | Approximate<br>ground<br>disturbance<br>adjacent to<br>disturbed<br>areas (acres) | Action<br>Category  | Proposed<br>Action   | Maintenance  | Approximate<br>new ground<br>disturbance<br>(acres)                      |
| Widforss Trailhead                             | 1 chemical<br>portable<br>toilet | Replacement                                   | Install a 1-<br>stall<br>Cascadian-<br>style vault<br>toilet  | Approximately<br>once every two<br>weeks  | 0.10 acres, no<br>trees removed   | Replacement   | Same as<br>Alternative B   | Same as<br>Alternative B   | Same as<br>Alternative B   |
| <b>SUMMARY</b>                                 | <b>18 SITES</b>                  | <b>10<br/>REPLACE,<br/>5 REHAB,<br/>3 NEW</b> | <b>Up to 22 – 30<br/>helicopter<br/>flights<br/>needed for<br/>construction<br/>at inner<br/>canyon sites</b> | <b>Up to 8<br/>flights/year<br/>proposed for<br/>maintenance<br/>of Three Mile<br/>and Pipe<br/>Creek</b> | <b>Approx 1.9<br/>acres and up<br/>to 13 small<br/>trees<br/>removed</b>          | <b>10<br/>REPLACE,<br/>5 REHAB,<br/>3 NEW</b>                 | <b>Up to 17 -25<br/>helicopter<br/>flights<br/>needed for<br/>construction<br/>at inner<br/>canyon sites</b> | <b>Up to 12<br/>flights/year<br/>proposed for<br/>maintenance<br/>of Three<br/>Mile and<br/>Pipe Creek</b> | <b>Approx 1.75<br/>acres and up<br/>to 9 small<br/>trees<br/>removed</b> |
| <b>ACCOMPLISHES<br/>PROJECT<br/>OBJECTIVES</b> | <b>No</b>                        |   | <b>Accomplishes<br/>all objectives</b>  |   |   |   | <b>Accomplishes<br/>objectives 2,<br/>3 and 4. Does<br/>not<br/>accomplish<br/>objective 1</b>               |  |  |

Table 5. Comparative Summary of Environmental Impacts.

| Impact Topic                          | Alternative A – No Action | Alternative B - Preferred  | Alternative C – Minimized Structure at Thee Mile   | Cumulative Impacts  |
|---------------------------------------|---------------------------|--|--|---|
| <b><u>Special Status Species:</u></b> |                           |  |  | Future actions would continue to be evaluated for impacts to special status species and consultation with USFWS would occur when adverse impacts are predicted. Cumulative impacts would be Minor to moderate and adverse |
| <b>Mexican Spotted Owl (MSO)</b>      | No additional impacts     | Minor short-term impacts due to construction noise, minimized through mitigation; No disturbance of habitat; may affect, but not likely to adversely affect (MANLAA) under Section 7 of the ESA. | Similar to Alternative B (minor adverse and short-term) but with reduced potential for noise impacts from helicopter flights into the inner canyon |   |
| <b>California Condor</b>              | No additional impacts     | Minor short-term impacts due to construction noise, minimized through mitigation; No disturbance of habitat; MANLAA under Section 7 of the ESA.  | Similar to Alternative B (minor adverse and short-term) but with reduced potential for noise impacts from helicopter flights into the inner canyon |   |
| <b>Peregrine Falcon</b>               | No additional impacts     | Minor short-term impacts due to construction noise; No disturbance of habitat; minimized through mitigation.   | Similar to Alternative B (minor adverse and short-term) but with reduced potential for noise impacts from helicopter flights into the inner canyon |   |
| <b>Bald Eagle</b>                     | No additional impacts     | Negligible short-term impacts due to increased noise at Phantom Ranch; No disturbance of habitat; MANLAA under Section of the ESA.   | Same as Alternative B  |   |

| Impact Topic                 | Alternative A – No Action   | Alternative B - Preferred  | Alternative C – Minimized Structure at Three Mile   | Cumulative Impacts  |
|------------------------------|---|--|---|---|
| <b>Northern Goshawk</b>      | No additional impacts   | Negligible short-term adverse impacts due to increased noise at Yaki picnic area; No disturbance of habitat  | Same as Alternative B   |   |
| <b>Niobrara Ambersnail</b>   | No additional impacts   | Negligible short-term adverse impacts due to potential for indirect disturbance to habitat at Indian Garden, minimized through mitigation  | Same as Alternative B   |   |
| <b>Grand Canyon Catchfly</b> | No additional impacts   | Negligible to minor short- and long-term adverse impacts due to potential for direct disturbance of habitat at Three Mile and Pipe Creek, minimized through mitigation   | Same as Alternative B   |   |
| <b>Wilderness</b>            | No additional impacts; on-going short-term localized impacts would continue | Widforss Trailhead, Three Mile and Pipe Creek proposed sites adjacent to proposed wilderness areas. Short-term, localized moderate adverse impacts due to construction-related disturbance. Long-term adverse impacts due to annual maintenance needs using helicopters. No alteration of areas proposed as wilderness or changes in use area designations | Similar to Alternative B, but with reduced potential for construction-related noise impacts from helicopter flights into the inner canyon – minor to moderate short-term adverse impacts would result. Long-term adverse impacts due to annual maintenance needs using helicopters. | There would be no changes in use area designations or proposed wilderness boundaries; future MRA's would be used to evaluate future actions with potential for effects to wilderness; cumulative impacts would be moderate and adverse. |

| Impact Topic                      | Alternative A – No Action   | Alternative B - Preferred   | Alternative C – Minimized Structure at Thee Mile   | Cumulative Impacts   |
|-----------------------------------|---|---|--|--|
| <b>Soundscape</b>                 | No additional impacts; existing anthropogenic noise levels would continue                             | Moderate, adverse short-term impacts due to construction noise and proposed helicopter flights in the Bright Angel Flight Free Zone. Over the long-term, impacts would be adverse, minor and localized. Up to an estimated 20-28% of 3 days would be disturbed by helicopter noise during construction. | Minor to moderate, adverse, short-term impacts due to construction noise and helicopter flights. It is estimated that there would be some level of recurring helicopter use annually due to increased Three Mile toilet maintenance needs. Over the long-term, impacts would be minor to moderate and localized. Up to an estimated 16-23% of 3 days would be disturbed by helicopter noise during construction. | Moderate adverse short- and long-term cumulative impacts due to additional anthropogenic noise levels with future projects. No adverse cumulative impacts would result that would be greater than that already occurring as a result of aircraft overflights |
| <b><u>Cultural Resources:</u></b> |   |   |  | Future actions would continue to be evaluated for impacts to cultural resources and consultation with affiliated tribes and SHPO would occur as necessary to minimize the potential for adverse impacts. Cumulative impacts would be moderate and adverse    |
| <b>Archeological Resources</b>    | No additional impacts   | Moderate adverse long-term impacts, minimized through mitigation and the development of a memorandum of agreement between NPS, SHPO and affiliated tribes.  | Same as Alternative B  |  |
| <b>Historic Resources</b>         | Long-term minor adverse impacts would continue due to incompatible structures near historic resources | No historic structures directly impacted; minor adverse long-term indirect impacts with construction of new buildings; minor long-term beneficial impacts due to replacement of incompatible structures with more appropriate ones  | Same as Alternative B  |  |

| <b>Impact Topic</b>           | <b>Alternative A – No Action</b>   | <b>Alternative B - Preferred</b>  | <b>Alternative C – Minimized Structure at Thee Mile</b>  | <b>Cumulative Impacts</b>  |
|-------------------------------|--|---|--|--|
| <b>Cultural Landscapes</b>    | Long-term minor adverse impacts would continue due to incompatible structures in identified cultural landscapes                                | Minor to moderate adverse impacts primarily due to disturbance to stone curbing and masonry walls in some places; minimized through mitigation; minor long-term beneficial impacts due to replacement of incompatible structures with more appropriate ones | Same as Alternative B  |  |
| <b>Ethnographic Resources</b> | Long-term minor adverse impacts would continue due to past development and continued park management in areas of concern to affiliated tribes  | Minor to moderate adverse impacts due to new construction in areas of concern to affiliated tribes; minimized through mitigation  | Same as Alternative B  |  |
| <b>Visitor Experience</b>     | Long-term minor to moderate adverse impacts would continue due to deteriorated condition of some restrooms and inadequate facilities at others | Moderate long-term beneficial impacts due to improved restroom facilities of adequate capacity and access to potable water at Pipe Creek; minor to moderate short-term adverse impacts during construction  | The same as Alternative B but with somewhat less of a beneficial effect to visitors at Three Mile due to smaller structure | Moderate beneficial cumulative impacts with continued implementation of actions designed to improve visitor services and the quality of visitor experience |

| Impact Topic           | Alternative A – No Action   | Alternative B - Preferred  | Alternative C – Minimized Structure at Thee Mile   | Cumulative Impacts  |
|------------------------|---|--|--|---|
| <b>Park Operations</b> | Long-term moderate adverse impacts would continue due to frequent upkeep and maintenance of inadequate facilities | Moderate long-term beneficial impacts due to substantially fewer maintenance trips to restrooms; minor to moderate adverse impact to inner canyon maintenance program due to addition of two new toilets to the program and the need for increased staffing to adequately maintain these facilities. | Minor to moderate long-term beneficial impact to overall park operations due to improvements in facilities, but somewhat reduced benefit over Alternative B due to increased maintenance needs for Three Mile and the need for increased staffing to adequately maintain these facilities. | Moderate beneficial cumulative impacts with continued implementation of actions designed to improve park facilities and minimize long-term needs through sustainable design |



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## Chapter 3 – Affected Environment and Environmental Consequences

### INTRODUCTION

This Chapter describes the present condition (i.e. affected environment) within the project area and the changes (i.e. environmental consequences) that can be expected from implementing the action alternatives or taking no action at this time. The no action alternative sets the environmental baseline for comparing the effects of the other alternatives. The impact topics (see Chapter 1) define the scope of the environmental concern for this project. The environmental effects, or changes from the present baseline condition, described in this chapter reflect the identified relevant impact topics, and include the intensity and duration of the action, mitigation measures and cumulative effects.

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented.

Grand Canyon National Park encompasses approximately 1.2 million acres in northern Arizona. Proposed project locations occur on the South Rim, North Rim, Desert View and the Inner Canyon, representing a wide variety of management zones and habitat types. Most sites occur in the development zone on the South Rim and North Rim. One proposed site occurs in the threshold management zone in proposed wilderness on the North Rim and five sites occur in the corridor management zone along the Bright Angel Trail and Phantom Ranch in the inner canyon. Most sites are existing disturbed sites near high visitor use areas.

### METHODOLOGY

The impact analysis and conclusions contained in this chapter were based on park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgement. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area.

Potential impacts in this chapter are described in terms of type (are the effects beneficial or adverse?), context (are the effects site-specific, local or even regional?), duration (are the effects short-term or long-term?), and intensity (negligible, minor, moderate or major). Because definitions of intensity can vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

For purposes of impact analysis in this Chapter, the following definitions of duration are used to characterize impacts discussed.

- Short-term – temporary effects typically confined to the construction period.
- Long-term – more permanent effects that would remain following construction.

### Cumulative Impacts

Cumulative impact is defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time (40 CFR 1508.7). Therefore, it is necessary to identify other ongoing or foreseeable future actions within the vicinity of the project area. Past and present activities related to visitor services or involving construction in visitor use areas in the vicinity of proposed project areas are listed in Table 6.

Table 6. Recently implemented and on-going projects related to visitor services and/or involving construction in Grand Canyon National Park.

| Development Area   | Project Status                                    |
|--|---|
| <b>Grand Canyon Village</b>  |   |
| Canyon View Information Plaza  | Complete  |
| Greenway Trail (Yavapai to Mather Point)   | Complete  |
| Greenway Trail (CVIP to Grand Canyon Village)  | Complete  |
| Greenway Trail (Mather to Pipe Creek Vista)  | Complete  |
| Walkway Rehabilitation   | Complete  |
| Albright Training Center Rehabilitation  | In Progress                                       |
| Non-government Housing Construction  | In Progress                                       |
| Maintenance Facility   | Complete  |
| Ranger Operations Building Rehabilitation  | In Progress                                       |
| Backcountry Information Center   | In Progress                                       |
| Mather Campground Rehabilitation, including campground restroom rehabilitation       | Complete  |
| Entrance Road Resurfacing  | Complete  |
| South Rim Emergency Services Building  | In Progress                                       |
| <b>Desert View and East Rim Drive</b>  |   |
| Desert View Improvements   | In Progress                                       |
| East Rim Drive Resurfacing   | Complete  |
| <b>North Rim</b>   |   |
| North Rim Campground Rehabilitation and Water Distribution System Improvements       | In Progress                                       |
| North Rim Emergency Services and Wildland Fire Building                              | In Progress                                       |
| Exposed Frame Cabin Rehabilitation   | In Progress                                       |
| North Rim Administration Building  | In Progress                                       |
| Concessionaire Dormitory Construction and RV Park Upgrades                           | In Progress                                       |
| North Rim Landfill Closure   | Complete  |
| North Kaibab Trail Maintenance   | On-going  |
| <b>Cross Canyon Corridor</b>   |   |
| Backcountry and Corridor Toilet Rehabilitation and Maintenance                       | In Progress                                       |
| Mile and a Half Composting Toilet  | Complete  |
| Corridor Trail Maintenance   | Various sections, some complete, some in progress |
| Bright Angel Trail Rest House Rehabilitation   | Complete  |
| Black and Silver Bridges Repair  | In Progress                                       |
| Routine backcountry management activities under the 1988 Backcountry Management Plan | On-going  |

For this analysis, foreseeable future actions are considered to be actions that currently have funding or for which funding are being sought and that could occur within the next five years. Five years was selected as the period for foreseeable future actions because many of the actions identified in the GMP are likely to be either planned or implemented by that time. Reasonably foreseeable future actions are described briefly in Appendix E.

A cumulative impact analysis was conducted for the full implementation of the GMP and is documented in the EIS. The general finding in the EIS for cumulative effects to natural resources was a net reduction in natural habitat within the Park and the region, but a net reduction less than that for two other alternatives analyzed. Cumulative effects to archeological resources could occur, specifically to traditional cultural properties, but a planned ethnographic survey program would minimize this likelihood. Cumulative effects were not expected to historic structures under the assumption that existing cultural resources within the park would be protected and preserved and some historic buildings would be rehabilitated and restored. Cumulative effects to visitor experience in the Park under implementation of the GMP were expected to be positive overall as the result of additional food service and accommodations and contributions to regional and national efforts to expand informational resources, expand interpretive and educational opportunities, and disperse tourism in the area.

Cumulative impacts are expected to be similar for any alternative selected because of the small amount of disturbance relative to the watershed as a whole and the fact that the majority of the restroom locations are on previously disturbed sites and sites of existing restroom facilities. If the No-Action Alternative was to be selected, and all other future projects were implemented, the impacts to the natural environment would still be similar to those that would occur if any one of the action alternatives for this project were selected. The differences between the action alternatives are also not measurable, when combined with other future actions on a watershed level. Therefore, the analysis applies to any alternative selected. Cumulative impacts are described in this Chapter for each impact topic.

### **Impairment**

In addition to determining the environmental consequences of implementing the alternatives, National Park Service policy (*Management Policies 2001*) requires analysis of potential effects to determine whether actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or

- identified as a goal in the park’s general management plan or other relevant NPS planning documents.

Impairment may result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The potential for impairment is discussed for each applicable resource for each alternative in this chapter. A statement summarizing the conclusions of this evaluation is included in the conclusion statement at the end of the environmental consequences section for each applicable resource in this chapter.

## SPECIAL STATUS SPECIES

### Affected Environment

Table 2 in Chapter 1 includes a list of threatened and endangered, proposed, and species of concern pertinent to this project, based on known occurrences or habitat preferences. The list in Table 7 below is more specific to each individual project site and was developed from personal knowledge of the area by park biologists, park records, the AGFD Heritage Nongame Data Management System database (2003), and Arizona Game and Fish Department and U.S. Fish and Wildlife Service biologists.

A detailed analysis of the expected effects of this project on Threatened and Endangered species is the subject of separate Biological Assessments (NPS 2002 and NPS 2004). A brief description of the special status species applicable to this project is included in Appendix D.

Table 7. Special Status Species Potential at Parkwide Restroom sites, Grand Canyon National Park.

| Toilet Site                 | Special Status Species                                       | Proximity  |
|-----------------------------|--|--|
| South Rim                   |  |  |
| Hermits Rest                | Mexican spotted owl<br>California condor                     | Mexican spotted owl Protected Activity Center within 0.25 miles<br>Condor potential at site during construction                                      |
| Hopi Point                  | California condor<br>Peregrine falcon                        | Condor potential at site during construction<br>Peregrine eyrie within 0.5 miles   |
| Yavapai Observation Station | California condor<br>Peregrine falcon                        | Condor potential at site during construction<br>Peregrine eyrie within 0.25 miles  |
| South Kaibab Trailhead      | Mexican spotted owl<br>California condor<br>Peregrine falcon | Mexican spotted owl Protected Activity Center within 0.25 miles<br>Condor potential at site during construction<br>Peregrine eyrie within 0.5 miles  |
| Yaki Point                  | Mexican spotted owl<br>California condor<br>Peregrine falcon | Mexican spotted owl Protected Activity Center within 0.25 miles<br>Condor potential at site during construction<br>Peregrine eyrie within 0.25 miles |

| Toilet Site                                  | Special Status Species  | Proximity  |
|--|---|--|
| Shoshone Point                               | Mexican spotted owl<br>California condor                          | Project site within Mexican spotted owl Protected Activity Center boundary<br>Condor potential at site during construction   |
| Grandview Trailhead                          | Mexican spotted owl<br>California condor<br>Zone-tailed hawk      | Mexican spotted owl Protected Activity Center within 0.25 miles<br>Condor potential at site during construction<br>Territory nearby                                      |
| Yaki picnic area                             | Mexican spotted owl<br>California condor<br>Northern goshawk      | Mexican spotted owl Protected Activity Center within 0.50 miles<br>Condor potential at site during construction<br>Goshawk detections within 1 mile, no known nest sites |
| Buggeln Hill picnic area                     | Mexican spotted owl<br>California condor<br>Peregrine falcon      | Project site within Mexican spotted owl Protected Activity Center boundary<br>Condor potential at site during construction<br>Peregrine eyrie within 0.5 miles           |
| Tusayan Museum                               | California condor   | Condor potential at site during construction   |
| <b>Desert View</b>                           |   |  |
| Desert View Campground                       | Mexican spotted owl<br>California condor<br>Peregrine falcon      | Mexican spotted owl Protected Activity Center within 0.5 miles<br>Condor potential at site during construction<br>Peregrine eyrie within 0.5 miles                       |
| <b>Cross Canyon Corridor – Phantom Ranch</b> |   |  |
| Three Mile                                   | California condor<br>Grand Canyon Catchfly                        | Potential for condor nesting areas in the vicinity<br>Catchfly potential along Bright Angel Trail  |
| Indian Garden                                | California condor<br>Niobrara Ambersnail<br>Grand Canyon Catchfly | Potential for condor nesting areas in the vicinity<br>Niobrara Ambersnail habitat nearby<br>Catchfly potential along Bright Angel Trail                                  |
| Pipe Creek                                   | Grand Canyon Catchfly<br>California condor                        | Potential for condor nesting areas in the vicinity<br>Catchfly potential along Bright Angel Trail  |
| Phantom Ranch                                | California condor<br>Bald Eagle                                   | Condor potential at site during construction<br>Bald eagle winter roost nearby   |

| Toilet Site             | Special Status Species          | Proximity  |
|-------------------------|---------------------------------|--|
| Bright Angel campground | California condor<br>Bald eagle | Condor potential at site during construction<br>Bald eagle winter roost nearby |
| North Rim               |                                 |  |
| North Kaibab Trailhead  | California condor               | Condor potential at site during construction                                   |
| Widforss Trailhead      | California Condor               | Condor potential at site during construction                                   |

### Environmental Consequences

#### **Methodology**

The baseline information used to assess impacts to special status species is as described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgement. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area. Additional sources of information on wildlife used as a basis for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact to special status species are defined as follows:

- Negligible:** an action that could result in a change to a population or individuals of a species, or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence. For purposes of Section 7 consultation for federally listed species, the change would likely result in a *no effect* determination.
- Minor:** an action that could result in a change to a population or individuals of a species or designated critical habitat. The change would be small, localized and/or discountable (unlikely to occur and not be able to be meaningfully measured, detected or evaluated). For purposes of Section 7 consultation for federally listed species, the change would likely result in either a *no effect* determination or a *may affect, not likely to adversely affect* determination, dependent on the species and its relation to the project area.
- Moderate:** an action that would result in some change to a population or individuals of a species or designated critical habitat. The change would not be discountable. For purposes of Section 7 consultation for federally listed species, the change would likely result in either a *may affect, not likely to adversely affect* determination or a *may affect, likely to adversely affect* determination, depending on the species and its relation to the project area. Consultation with the U.S. Fish and Wildlife Service would occur to confirm the appropriate determination.
- Major:** an action that would result in a noticeable change to a population or individuals of a species or designated critical habitat. For purposes of Section 7 consultation for federally listed species, the change would likely result in a *may affect, likely to adversely affect* determination. Consultation with the U.S. Fish and Wildlife Service would occur to confirm the appropriate determination, and determine if the action would jeopardize the continued existence of a species or adversely modify critical habitat

#### **Alternative A - No Action**

*Direct/Indirect Impact:* The no action alternative would maintain the project area in its current state and would continue to provide habitat for many wildlife species, although habitat quality in the



immediate area would remain relatively low due to the existing level of development and human activity. Without a change in vegetation or human use in the project area, wildlife populations would generally remain the same. Selection of the no action alternative would not affect TES species in the project vicinity, or their habitat, beyond the on-going impacts of visitation and human activity that have been occurring in these areas for many years. The continued use of the existing restroom sites would not impact any sensitive wildlife habitat requirements such as nesting and/or roosting sites or primary wildlife travel corridors. Selection of the no action alternative would therefore have no direct or indirect impact on special status species.

*Cumulative Impact:* Combining taking no action at this time with past, present and foreseeable future actions would continue to keep habitat quality in projects areas relatively low due to the existing level of development and human activity in these areas. The past and on-going actions (Table 6) in addition to other actions planned in the future (Appendix E) would continue to impact special status species and their habitat to some degree in the park. Projects tend to be concentrated in the developed areas of the park, minimizing habitat fragmentation and disturbance to special status species in other areas of the park. These impacts are expected to be minor to moderate over the long-term, minimized by the adherence to conservation measures for individual species and future consultations with USFWS for any future projects that have the potential for more than discountable impacts.

Mexican Spotted Owl: Ongoing activities at the South Rim, North Rim, Desert View, Hermits Rest, Bright Angel Trail and Phantom Ranch create daily disturbance essentially year-round (with the North Rim a possible exception during the winter months when park facilities are closed). This disturbance has decreased the quality of habitat in and around these developed areas for Mexican spotted owl and would continue under the No-Action Alternative. These local, adverse, long-term impacts are minor due to the lack of suitable nesting habitat near these areas and the amount of foraging habitat affected is minor compared to the amount of available habitat. It is possible that over the past hundred years of increased development and visitation to the Grand Canyon that developed areas along canyon rim edges may have adversely affected Mexican spotted owl nesting and roosting areas below the canyon rims, possibly as a result of increased noise and loss of habitat. This is only speculative, however. No vegetation manipulation or construction activities are proposed under Alternative A, and no new sources of disturbance would be introduced. Alternative A would therefore have no additional effects on Mexican spotted owl.

California Condor: Existing developments at the South Rim, North Rim, Desert View, Hermits Rest, Bright Angel Trail and Phantom Ranch create year-round human presence in the project vicinities. Human presence creates the possibility for condor/human interactions. Condors are monitored daily via radio telemetry, and any condors that land in the developed areas would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Current Park policies and activities would be continued under Alternative A, and adverse impacts to condors would be negligible, long-term, and local. No vegetation manipulation or construction activities are proposed under Alternative A. No California condor habitat would be impacted, and no new sources of disturbance would be introduced with this alternative. Therefore, the No-Action Alternative would have no additional effects on California condors.

Peregrine Falcon: The construction of existing developments on portions of the North Rim, South Rim, East Rim Drive and Hermits Rest Road has likely affected potential nesting and foraging habitat for peregrine falcons. This local, adverse, long-term impact is minor because the amount of habitat affected is negligible compared with the amount of available habitat. Noise from year-round activities may affect eyries in proximity to developed areas, particularly along the South Rim. However, many of these eyries close to developed areas have been continually occupied for many years. No construction would take place under Alternative A, and this alternative would have no additional effects on peregrine falcons.

Bald Eagle: The construction of existing developments on portions of the North Rim, South Rim, East Rim Drive, Hermits Rest, Bright Angel Trail and Phantom Ranch has likely affected potential wintering roosting and foraging habitat for bald eagles. This local, adverse, long-term impact is minor because the amount of habitat affected is negligible compared with the amount of available habitat. Noise from year-round activities may affect winter roosts in proximity to developed areas, particularly along the South Rim and at Phantom Ranch. No construction would take place under Alternative A, and this alternative would have no additional effects on bald eagles.

Northern Goshawk: Existing developments on certain areas of the South Rim and North Rim have resulted in the removal or modification of potential nesting and foraging habitat for the northern goshawk. Human activity at the South Rim and North Rim also reduces the suitability of the area for nesting and foraging by goshawks. Existing development and human activity could have adverse, local, long-term, minor impacts on northern goshawks. No additional habitat would be modified under the No-Action Alternative, and this alternative would not have any additional effects on northern goshawks.

Niobrara Ambersnail: Development that has occurred at Indian Garden in the past has likely affected Niobrara ambersnail habitat to some extent in this area. This local, adverse, long-term impact is considered minor to moderate due to the localized nature of the potential habitat in this area and the loss of riparian wetland habitat due to past development within the floodplain. No construction would take place under Alternative A and this alternative would have no additional effects on Niobrara ambersnails.

Grand Canyon Catchfly: The construction of existing trails and other developments along the Bright Angel Trail has likely affected the habitat potential for this species in the inner canyon. This local, adverse, long-term impact is minor. Alternative A would not require site or vegetation disturbance and impacts to this plant along the Bright Angel Trail is not expected.

*Impairment:* Direct, indirect, and cumulative impacts to special status species would be negligible to moderate as a result of implementing the no action alternative. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

### **Alternative B – Preferred Alternative**

*Direct/Indirect Effects.* Implementation of Alternative B would not result in substantial changes in overall ground disturbance or habitat disturbance over the existing condition. Only a total of 2 acres of disturbance is expected, and this is spread out over 18 sites, adjacent to existing parking areas or visitor concentration areas. Habitat quality in these areas is already diminished due to existing disturbance and visitation levels. The minor changes proposed under Alternative B would not result in measurable changes in wildlife populations over the long-term. The continued use of the existing restroom sites would not impact any sensitive wildlife habitat requirements such as nesting and/or roosting sites or primary wildlife travel corridors, with the exception of the possibility of short-term adverse impacts due to increased construction noise in project areas during project implementation. Mitigation measures have been developed to minimize this likelihood, as described at the end of Chapter 2 and discussed below. Improvements in existing restroom facilities and installation of more permanent structures, such as replacement of chemical toilets with vault toilets, would lengthen the time between maintenance and servicing trips to these toilets, decreasing human and vehicle noise

and activities in these areas. Installation of toilets in areas with high visitor use that currently do not have a restroom facility (Yaki Point picnic area, Three Mile and Pipe Creek) would eliminate toilet paper and human waste on the landscape, benefiting these habitats and the wildlife species using these areas.

Mexican Spotted Owl: Impacts to Mexican spotted owl as a result of implementation of the preferred alternative would be primarily a result of noise disturbance from construction activity. Several proposed project sites are either in or within 0.5 miles of a known protected activity center (PAC). Mitigation measures have been developed jointly with the Fish and Wildlife Service to minimize the likelihood for adverse impacts, including breeding season restrictions on these activities, as described fully in the associated biological assessments (NPS 2002 and 2004) and summarized at the end of Chapter 2. If blasting is deemed necessary for any particular site, this would be restricted to the non-breeding season if within 1 mile of a confirmed PAC, as described in Chapter 2. None of the proposed toilet locations occur in critical habitat or habitat considered suitable for nesting or roosting. Mexican spotted owl are not likely to be permanently displaced as a result of this project due to the small amount of disturbance and the fact that no substantial changes in recreational or operational use or timing of use would result, and the availability of similar habitat in surrounding areas. Therefore, adverse impacts are expected to be minor and short-term.

California Condor: Impacts to California condors as a result of implementation of the preferred alternative would be primarily a result of noise disturbance from construction activity. Mitigation measures have been developed jointly with the Fish and Wildlife Service to minimize the likelihood for adverse impacts, including breeding season restrictions on these activities where necessary. If blasting is deemed necessary for any particular site, this would be restricted to the non-breeding season if within 1 mile of a confirmed nesting area, as described in Chapter 2. None of the proposed toilet locations occurs in habitat considered suitable for nesting. Condors are not likely to be permanently displaced as a result of this project due to the small amount of disturbance, the fact that no substantial changes in recreational or operational use or timing of use would result, and the availability of similar habitat in the surrounding area. New structures proposed under this Alternative that may attract condors to roost on them would have Nixalite installed, as described in the description of Alternative B. Therefore, adverse impacts to condors are expected to be minor and short-term.

Peregrine Falcon: As described for Mexican spotted owl and condors, impacts to peregrines would be primarily a result of noise disturbance during construction activity. Many of the project areas are near Mexican spotted owl areas and would require Mexican spotted owl breeding season restrictions on construction activity. The breeding season for peregrines and owls are similar and this already existing restriction has the potential to indirectly minimize the possibility of disturbance to peregrines. None of the proposed toilet locations occur in habitat considered suitable for peregrine nesting. Peregrines are not likely to be permanently displaced as a result of this project due to the small amount of disturbance, the fact that no substantial changes in recreational or operational use or timing of use would result, and the availability of similar habitat in the surrounding area. Therefore, adverse impacts are expected to be minor and short-term.

Bald Eagle: The only two project areas in vicinity of known bald eagle winter roosts are Phantom Ranch and Bright Angel campground restrooms. These two sites have existing flush restrooms that are proposed for interior/exterior rehabilitation. These actions would not require construction equipment on site and would primarily consist of minor work on the building itself using hand tools. These areas are already high visitor use areas. No changes in visitor use patterns or existing

conditions are expected. For these reasons, adverse impacts to wintering bald eagles using the Bright Angel creek area would be negligible and short-term. If other winter roosts are confirmed in other areas of the park near project locations, the applicability of seasonal restrictions would be considered.

Northern Goshawk: The only two project areas within proximity of potential nesting habitat for goshawks are Widforss Trailhead and Yaki picnic area. Surveys are complete for the habitat around Widforss Trailhead and no goshawks have been detected nearby (confirm). Surveys have also occurred recently in the vicinity of Yaki picnic area and a goshawk territory was confirmed. No nest sites were confirmed and the nearest goshawk detections during this survey effort were greater than a mile away. The proposals for these two locations include construction of a prefabricated vault toilet in existing disturbed areas adjacent to existing visitor parking areas. No trees would be removed. These areas are already high visitor use areas and no changes in visitor use patterns or existing conditions are expected. Potential goshawk nesting or foraging habitat would not be disturbed as a result on implementation of Alternative B. For these reasons, adverse impacts to Northern goshawks would be negligible and short-term.

Niobrara Ambersnail: Impacts to ambersnails as a result of implementation of Alternative B, if any, would be primarily a result of indirect disturbance from construction activity, and not from direct disturbance of habitat. Project-related activity would only occur at the site of the existing composting toilet in the upper end of the campground, approximately 0.10 miles upstream of ambersnail habitat. The proposed work is considered interior/exterior rehabilitation and site work resulting in any ground disturbance would be extremely limited. The majority of the work would occur inside the building and on the structure itself. If ground-disturbing site work is identified during later design phases for this project, known and potential ambersnail habitat would be identified and flagged by a NPS biologist prior to the commencement of this site work and the area would be avoided. Measures would be taken to assure that no surface disturbance or sedimentation would occur in Niobrara ambersnail habitat at Indian Garden. For these reasons, adverse impacts to Niobrara ambersnails would be negligible and short-term.

Grand Canyon Catchfly: There is potential habitat for this sensitive plant species along the Bright Angel Trail. It is unclear whether habitat exists at each specific project area at Indian Garden, Three Mile or Pipe Creek, but it is unlikely due to the developed nature of the area at Indian Garden campground and the extent of the disturbance at the proposed site for Three Mile. Surveys for this species would be conducted prior to project implementation to confirm its absence. If individuals of this species are located in or near proposed project areas, protective measures would be implemented, in consultation with the Park's Inner Canyon Vegetation Program Manager. For these reasons, adverse impacts to Grand Canyon catchfly would be negligible to minor and both short- and long-term.

*Cumulative Impacts*: Implementation of the preferred alternative, in combination with past, present and reasonably foreseeable future actions (Table 6 and Appendix E) would potentially result in changes to special status species populations and habitats. However, species-specific protective measures for any current or planned individual project would be incorporated into the project to minimize the potential for adverse impacts, including such things as breeding season restrictions and avoidance of occupied or potential habitat. Detailed biological assessments for current and future projects with the potential for impacts to special status species would be prepared and would form the basis for consultation with the Fish and Wildlife Service. Projects on-going and planned are, in general, located in existing developed areas in the park. The cumulative impact of implementation of these actions, generally-speaking, would be confined to areas where habitat quality for many special status species has been previously degraded and is not currently providing high-quality habitat currently, or may be just on its periphery. Confining future short-term noise impacts and ground-disturbing activities to these existing developed areas would minimize the likelihood of adverse

impacts to special status species populations within the park. Obviously, exceptions to this include larger park-wide planning efforts (Fire Management Plan, Colorado River Management Plan, etc.). However, these larger and more complex planning efforts will also take cumulative impacts into account and a detailed analysis of effects to special status species would be a key component of each of these analyses. For these reasons, cumulative impacts to special status species would be minor to moderate, adverse and long-term.

**Section 7 Consultation:** A detailed analysis of the expected effects of this project on Threatened and Endangered species is the subject of separate Biological Assessments (NPS 2002 and NPS 2004). The potential for adverse impacts to federally listed species from implementation of the majority of the proposed sites, as identified in the preferred alternative, was consulted on with the U.S. Fish and Wildlife Service (USFWS) in 2002. USFWS concurred with the park's determination that implementation of sixteen of the eighteen proposed restroom sites, along with many other construction projects in the park over the next five years, may affect, but is not likely to adversely affect, the Mexican spotted owl, California condor, bald eagle or their habitat. Peregrine falcons were also discussed in this document (USFWS letter July 9, 2002). The proposed restroom at Pipe Creek and Yaki picnic area were not included in the June 2002 biological assessment and are the subject of a separate Biological Assessment (NPS 2004). Consultation with FWS for these two sites is underway.

*Impairment:* Direct, indirect, and cumulative impacts to special status species would be negligible to moderate as a result of implementing Alternative B. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

#### **Alternative C – Minimized Structure at Three Mile**

*Direct/Indirect Effects.* The primary difference between Alternative B and Alternative C is in the size of the structure proposed at Three Mile. While the footprint of disturbance for this smaller building would be slightly less than the one proposed under Alternative B, this would still not result in changes to special status species habitat. The proposed location is an existing disturbed borrow pit and vegetation would not be removed under either Alternative B or C at this site. Therefore, direct impacts to special status species would be the same as that described for Alternative B. Indirect effects, however, would be somewhat different under Alternative C due to the reduced number of helicopter flights necessary for construction. Increased long-term maintenance needs at Three Mile using mules would not result in any additional impacts to special status species. Alternative C would require up to 5 – 13 fewer helicopter flights for transport of construction materials. The decreased level of flight time would reduce the potential for short-term noise impacts to special status species within or near the flight path (Mexican spotted owl and condor potential). As determined in consultation with the parks' wildlife biologist, restrictions on flights in or over Mexican spotted owl PACs or known condor nesting areas during the breeding season would be applied to flights to minimize the potential for disturbance. Flights would avoid the critical breeding seasons of most species and would minimize the magnitude of effect. For these reasons, implementation of Alternative C would result in adverse impacts to special status species that would be negligible to minor and short-term.

*Cumulative impact:* Five to 13 fewer helicopter flights, while reducing the potential for indirect impacts to special status species due to less noise disturbance, would likely not result in changes in cumulative impacts other than that which is described for Alternative B. Helicopter flights proposed

for this project are one-time needs, terminating when all materials for construction have been transported in. Combining this short-term noise impact, slightly reduced under Alternative C as compared to Alternative B, with other past, present and reasonably foreseeable future projects would not result in measurable impacts to special status species. For these reasons, cumulative impacts to special status species are the same as that described for Alternative B.

*Impairment:* Direct, indirect, and cumulative impacts to special status species would be negligible to moderate as a result of implementing Alternative C. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wildlife resources or park values.

**Section 7 Consultation** – This is the same as that described for Alternative B.

**Conclusions:** Alternative A would result in adverse direct, indirect and cumulative impacts to special status species (Mexican spotted owl, condor, peregrine falcon, bald eagle, goshawk, ambersnail, and Grand Canyon catchfly) that range from negligible to minor. Alternative B and C would result in adverse direct, indirect and cumulative impacts that range from negligible to moderate. The reduction in one-time helicopter flights for transport of construction materials into Three Mile would result in slightly less indirect short-term adverse impacts to special status species (primarily Mexican spotted owl and condor).

## WILDERNESS

### Affected Environment

Most of the Grand Canyon lies within proposed wilderness. NPS policies require that these proposed areas be managed under the provisions of the Wilderness Act. The Wilderness Act of 1964 required all federal land management agencies to reexamine their resources for possible wilderness classification. In 1976, the NPS prepared a draft environmental statement (ES) and preliminary wilderness proposal that was reviewed by the public. This recommendation included a designation of 980,088 acres in Grand Canyon National Park (approximately 80% of the Park) and was forwarded to the Department of Interior in 1980. An additional 131,814 acres, approximately 11% of the Park, was also proposed for potential wilderness designations. In 1993, the Park conducted an internal review and update of the 1980 Wilderness Recommendation and some revisions were made including a refinement of the acreage estimates determined by Geographical Information Systems (GIS). All modifications were consistent with the intent of the 1980 recommendation. In 1993, the Superintendent transmitted this recommendation to the Director of the National Park Service (NPS 1993). Action on this recommendation is still pending. However, the Park continues to manage all areas proposed for wilderness designation as wilderness, according to the direction in DO-41.

The two proposed new toilet locations along the Bright Angel Trail (Three Mile and Pipe Creek) evaluated in this document occur in the cross-canyon corridor, outside of proposed wilderness, and are managed under the guidance of Grand Canyon National Park's General Management Plan and Grand Canyon's 1988 Backcountry Management Plan, as part of the Corridor Management Zone. Trails in the Corridor Zone act as thresholds to wilderness use areas. Standard Operating Procedures for determining minimum requirements for management actions in proposed wilderness can sometimes apply to actions in the corridor, depending on the scope of the project, type of activity, and potential for impacts. In this case, the methods for transporting materials necessary for construction of these proposed toilets and the methods used to maintain the facilities once constructed have the



potential for both direct and indirect impacts to adjacent proposed wilderness areas and is the subject of this analysis.

The Widforss Trailhead parking area is adjacent to proposed wilderness in a Threshold Management Zone NF9 (NPS 1988 and NPS 1998). Standard Operating Procedures for determining minimum requirements for management actions adjacent to proposed wilderness can sometimes apply if there is the potential for wilderness to be affected, depending on the scope of the project and type of activity.

The minimum requirements analysis for this project is summarized in Appendix F and discussed in the section below. Aspects of the potential for impacts to wilderness also overlap the subject matter of the visitor experience, park operations and soundscape portions of this document.

### Environmental Consequences

#### **Methodology**

Wilderness characteristics were derived from the Wilderness Act of 1964 and were evaluated and compared based on the alternatives. Application of the minimum requirement analysis (MRA) is a part of both action alternatives. Under each alternative, wilderness is considered and addressed through the description of impacts to “wilderness character”. As stated in the Wilderness Act of 1964, wilderness character is made up of qualities such as “untrammeled”, “natural”, “undeveloped”, and “potential for primitive recreation/solitude”.

Additional sources of information on wilderness in Grand Canyon National Park used as a basis for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact to wilderness are defined as follows:

- Negligible:** a change in wilderness character could occur, but it would be so small that it would not be of any measurable or perceptible consequence.
- Minor:** a change in wilderness character and associated values would occur, but it would be small, and, if measurable, would be localized.
- Moderate:** a change in wilderness character and associated values would occur. It would be measurable, and localized.
- Major:** a noticeable change in wilderness character and associated values would occur. The change would be measurable, and would have a substantial or possibly permanent consequence.

#### **Alternative A - No Action**

*Direct/indirect impacts:* Implementation of Alternative A would not result in impacts to wilderness designations or wilderness character. With no changes in existing conditions at the 18 restroom sites included in this analysis, no changes in helicopter flights or access to proposed wilderness areas would occur. Since none of the existing toilet locations actually occur within the boundaries of proposed wilderness, no direct or indirect impacts to wilderness designations or wilderness character would occur with implementation of the no action alternative.

*Cumulative impacts:* Combining taking no action at this time with past, present and reasonably foreseeable future actions would continue to result in some short-term indirect minor impacts to wilderness due to the use of occasional administrative helicopter use of other access over or through wilderness to access project areas. Future proposed actions that occur in the inner canyon (Appendix E: corridor fire protection, Indian Garden ranger station rehabilitation, Phantom Ranch ranger station rehabilitation, and the revision of the backcountry plan) may require the use of helicopter flights to

transport materials in for the work. These would be the subject of a project-specific minimum requirements analysis and would be evaluated based on that flight request in combination with other flights already occurring as a result of on-going projects or programs. Therefore, while impacts from past, present and planned projects as a result of helicopter flights would occur cumulatively over time, these impacts would be minor to moderate in intensity, would last the short duration of the flights and would be localized.

*Impairment:* Direct, indirect, and cumulative impacts to wilderness would be negligible to moderate as a result of implementing Alternative A. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wilderness resources or park values.

### **Alternative B**

*Direct/Indirect impacts:* Restrooms proposed for Widforss Trailhead, Pipe Creek and Three Mile fall under the "minimum tool concept," which allows for Park superintendents to select the method or administrative practice necessary to successfully and safely accomplish the management objectives with the least impact on wilderness character. All three of these sites occur adjacent to proposed wilderness, although none of them actually occur within proposed wilderness boundaries. A minimum requirements analysis to determine the minimum tools or methods necessary for both the installation and long-term maintenance of these toilets near proposed wilderness is summarized in Appendix D. Replacement of the existing chemical toilet at Widforss Trailhead with a permanent vault toilet is in keeping with NPS policies and park direction for this developed area and its location adjacent to a Threshold Management Zone (NPS 1988). Transportation of construction materials to the site would occur on existing roads and would not cross any proposed wilderness boundaries. The project area itself is on the edge of the wilderness boundary and park staff and/or contractors on site during construction would be made aware of this boundary. Increased traffic on the access road during construction and construction noise and increased human activity at the site during construction has the potential to impact visitors at the trailhead. With the replacement of the existing temporary chemical toilet with a larger capacity vault, the need for maintenance would be reduced and would result in potentially fewer contacts between park staff and visitors. This could positively impact wilderness qualities such as the potential for primitive recreation and solitude. While these short-term construction activities would affect the qualities of untrammeled, undeveloped, and the opportunities visitors accessing the nearby wilderness would have for solitude, these impacts would be short-term, lasting only the duration of the construction. Long-term impacts to wilderness character would be negligible.

Construction of a new composting toilet at Three Mile and Pipe Creek is in keeping with NPS policies and park direction for the corridor management zone (NPS 1998 and NPS 1995). Neither of the proposed sites are within proposed wilderness boundaries. The proposed transport of construction materials into the project sites via helicopter would affect wilderness and visitors near the flight path during this transport. As described in soundscape and visitor experience sections, the level of flights necessary has the potential to result in noise impacts up to 20 to 28% of the three days that flights are expected during the mobilization effort. Changes to wilderness character such as naturalness and potential for solitude would occur where audible in wilderness areas below the flight path, but it would be localized. While this adverse impact is short-term, lasting only the duration of the project, it would be moderate in intensity. Changes would be temporary and would be a result of increased noise and visibility of a mechanized equipment over wilderness.

Alternative B would not result in alteration of the areas proposed for wilderness designation and would not result in any changes to proposed wilderness boundaries in the Park.

*Cumulative impacts:* Combining this proposal with implementation of past, present, and reasonably foreseeable future actions, as described in Appendix E, would not result in changes to backcountry use area designations or the potential for areas to be designated as wilderness at some point in the future. None of the alternatives nor any foreseeable future actions includes any alteration of the areas proposed for wilderness designation and would not result in any changes to proposed wilderness boundaries in the Park. Current and foreseeable future actions with the potential for impacts to wilderness would be the subject of a minimum requirement analysis and a determination of the minimum tool necessary to implement project. The application of the minimum requirements analysis process would ensure that cumulative impacts to wilderness resources and character in the park are minimized. However, some of the projects identified in Appendix E may require helicopter flights or other mechanized equipment for implementation. Even if these are ultimately deemed the minimum tool, would still result in impacts to wilderness character that would be moderate, long-term and adverse, when combined with other past and future projects.

*Impairment:* Direct, indirect, and cumulative impacts to wilderness would be minor to moderate as a result of implementing Alternative B. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park; or (3) identified as a goal in the Park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's wilderness resources or Park values.

### **Alternative C – Minimized Structure at Three Mile**

*Direct/Indirect impacts:* The primary difference between Alternative B and C is in the toilet proposed at Three Mile. Alternative C proposes a somewhat smaller structure than Alternative B and would therefore require fewer helicopter flights for construction than Alternative B. As described in soundscape and visitor experience sections, the level of flights proposed has the potential to result in noise impacts up to 16 to 23% of the three days that flights are expected during the mobilization effort, less than that proposed for Alternative B. Changes to wilderness character such as naturalness and potential for solitude would occur where audible in wilderness areas below the flight path, but it would be localized. While this adverse impact is short-term, lasting only the duration of the project, it would be minor to moderate in intensity. Changes would be temporary and would be a result of increased noise and visibility of mechanized equipment over wilderness.

*Cumulative impacts:* Same as Alternative B

*Impairment:* Same as Alternative B

**Conclusions:** None of the alternatives includes any alteration of the areas proposed for wilderness designation and would not result in any changes to proposed wilderness boundaries in the Park. Implementation of any of the alternatives would be in keeping with NPS policies and park guidance for these areas outside of proposed wilderness boundaries (NPS 1988 and 1995) The potential for impacts to wilderness character would occur under both Alternatives B and C due to the proposed use of helicopter flights over proposed wilderness areas, but these impacts would be localized and short-term, lasting only the duration of the project. Alternative A would result in negligible adverse direct, indirect and cumulative impacts to wilderness character. Alternative B would result in direct and indirect impacts to wilderness that would be moderate and adverse, but short-term, and cumulative impacts that would be moderate and adverse. Alternative C would result in direct and indirect impacts that would be minor to moderate, short-term impacts, and cumulative impacts that would be moderate and adverse.

## SOUNDSCAPE

### Affected Environment

The NPS is mandated by Director’s Order 47 to protect, maintain, or restore the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with Parks and Park purposes. They are inherent components of “the scenery and the natural and historic objects and the wild life” protected by the NPS Organic Act. They are vital to the natural functioning of many Parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the Service’s ability to accomplish its mission.

Grand Canyon National Park continues to be the focus of attention regarding the effects of aircraft overflights on natural quiet and visitor experience. The park natural soundscape is significantly adversely affected by aircraft overflights during the high visitation season (May-October). Efforts to reduce the impacts of aircraft noise on the natural soundscape of the park include strict regulation of air tour routes and capping the number of authorized commercial air tours by the Federal Aviation Administration (FAA). Park management has attempted to limit the administrative use of aircraft in the Park by implementing a stringent flight approval processes. The goal is to minimize the potential for impacts to natural quiet (soundscape) and the visitor experience in the Park from all aircraft (Ebersole pers. comm. 2002, McMullen pers. comm. 2004). Extensive noise measurements have been gathered in the Park. A close approximation of natural quiet is the measured natural ambient sound condition, with all sounds of human origin excluded. The natural ambient data show that Grand Canyon is generally a very quiet place (NPS 1995a).

The decibel (dB) is a standard unit of measurement for sound. Because sounds of different frequencies may or may not be perceived as noise by humans, sound measurements are weighted for sensitivity in particular frequencies and are expressed in A-weighted units (dBA). Typical ambient levels in Grand Canyon Village are in the 50 to 60 dBA range [as a point of reference, a typical conversation between two people would be about 60 dBA while busy street traffic would be about 70 dBA (NPS 1995a)]. Typical ambient levels in the Park’s more remote areas with less vegetation and human influences to contribute to noise can approach 10 dBA, which is at the threshold of human hearing. Table 8 displays several typical ambient noise levels measured throughout the Park.

Table 8. Ambient Sound Levels at selected areas of Grand Canyon National Park (taken from NPS 1995).

| Location   | Ambient Sound Level (dBA) | Range of Ambient Levels (dBA) |
|--|---------------------------|-------------------------------|
| Grand Canyon Village   | 50-60                     | NA                            |
| Desert View Watchtower Area                                    | 34-48                     | 29-58                         |
| Phantom Ranch Overlook<br>(Bright Angel Creek clearly audible) | 41                        | 39-44                         |
| Inner Canyon Locations away from the sound of moving water     | 22-28                     | 12-38                         |

In general, corridor management zones have higher ambient sound levels than threshold, primitive or wild zones. A site-specific sound analysis has not been conducted at each of the project locations. For purposes of this analysis it is assumed that Three Mile, Indian Garden, Pipe Creek and Phantom

Ranch have ambient sound levels of approximately 39 - 44 dBA, similar to the sound level measured at Phantom Ranch overlook.

The proposed use of helicopters to transport construction materials and supplies into Three Mile and Pipe Creek during the course of this project is the primary project component that is expected to result in increased noise in or near proposed wilderness areas, which includes the Bright Angel Flight Free Zone (FFZ). The typical sound level for a helicopter taking off is estimated at 88 dBA at 200 feet, and a helicopter landing is estimated at 80 dBA at 200 feet. The park is committed to the use of a quiet technology helicopter for all administrative uses that can be accommodated with a helicopter of this size.

**Aircraft Overflights:** The park is committed to substantially restoring the natural quiet and visitor experience of the park, in accordance with Public Law 100-91 (August 1987), the National Parks Overflight Act. This includes measuring the noise impacts of all types of aircraft overflights; i.e., commercial air tour, general aviation, military and airline operations to assess the impact of these flights on natural quiet. There are presently between 18 and 20 commercial air tour operators that fly over Grand Canyon National Park. These companies are strictly regulated by the Federal Aviation Administration (FAA), including but not limited to adhering to minimum altitudes and a maximum number of air tour flights per year. This is a very sensitive issue that the park is committed to addressing and working with the FAA to resolve, including the implementation of current and future regulations. Discussions and evaluations of aircraft generated noise are ongoing and noise levels are being assessed with multiple affected parties.

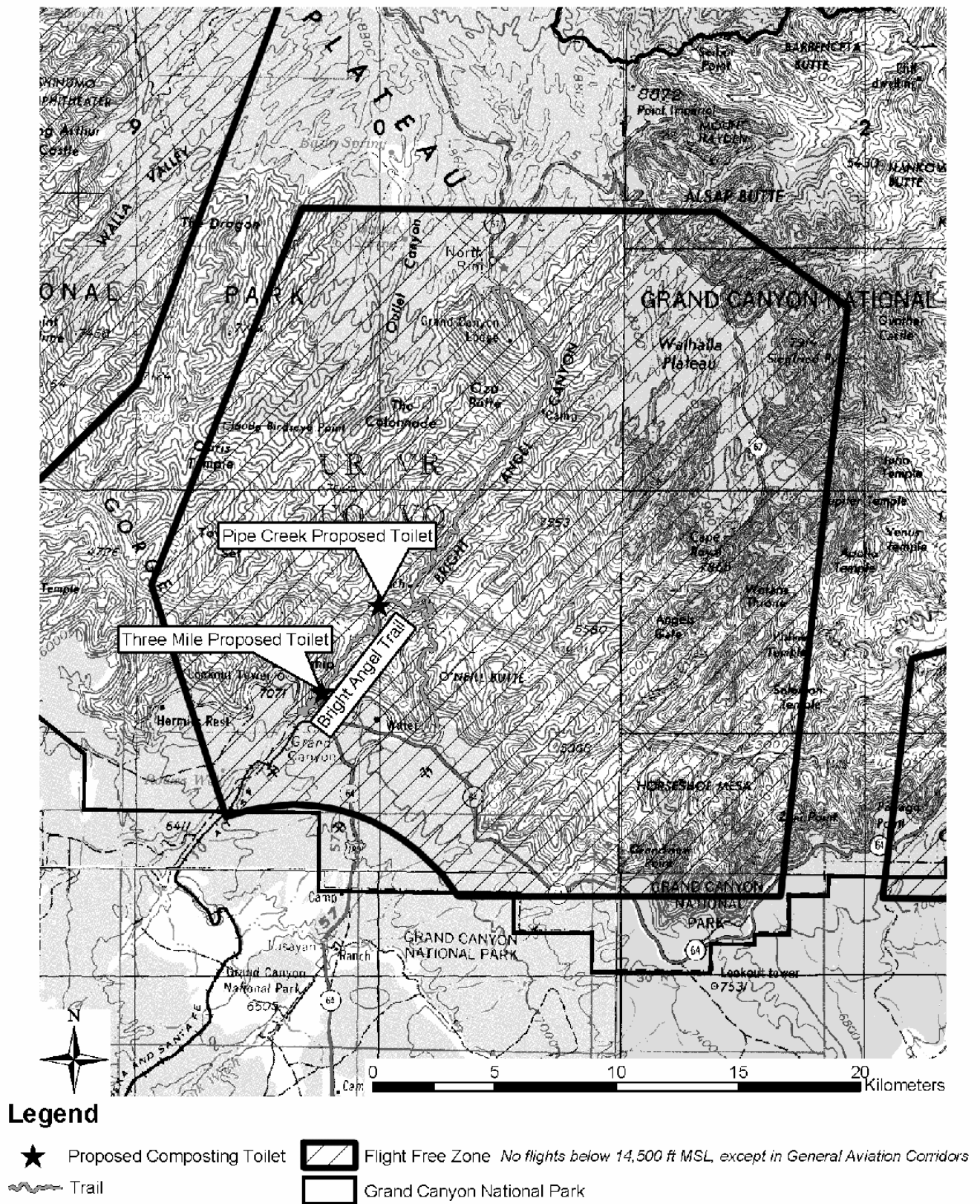
### Environmental Consequences

#### **Methodology**

The thresholds of change for the intensity of an impact are defined as follows:

- Negligible:** the noise impact to a resource or value is barely detectable, and/or will affect few visitors on the North and South Rims, corridor trails and river corridor within the Bright Angel Flight Free Zone (Figure 16) the area of potential affect.
- Minor:** the noise impact to a resource or value is slight but detectable, and/or will affect some visitors on the North and South Rims, corridor trails and river corridor within the Bright Angel Flight Free Zone (Figure 16), the area of potential affect.
- Moderate:** the noise impact to a resource or value is readily apparent and/or will affect many visitors on the North and South Rims, corridor trails and river corridor within the Bright Angel Flight Free Zone (Figure 16), the area of potential affect.
- Major:** the noise impact to a resource or value is severely adverse and/or will affect the majority of visitors on the North and South Rims, corridor trails and river corridor within the Bright Angel Flight Free Zone (Figure 16), the area of potential affect.

Figure 16. Bright Angel Flight Free Zone





**Assumptions Regarding Aircraft Overflights:** The aircraft overflight issue cannot be ignored when evaluating the cumulative impact these overflights might have on soundscape when combined with other administrative uses of aircraft in the Park. However, administrative flights in support of this project would occur below the minimum altitude set for commercial operators, they would be localized, intermittent, and short-term, lasting only the duration of the project, and would be used when no other method is deemed feasible or practical. The regulations currently placed on commercial air tour companies have not allowed the park to meet the mandated goal of substantial restoration of natural quiet (50 percent or more of the park achieves natural quiet (i.e., no aircraft audible) for 75-100 percent of the day, every day). It is a given that aircraft overflights currently result in significant adverse impacts to the park's soundscape during the high visitation season (May-October). Once substantial restoration of natural quiet is achieved, however, it is assumed that aircraft overflights will result in minor to moderate impacts during the entire year. Evaluation of the impact of occasional individual administrative aircraft use in the park will assume that administrative aircraft overflights are already contributing moderate impacts to the park's soundscape. Cumulative impact analysis for the alternatives below will focus on the potential for additional impacts from implementation of the alternative, recognizing that moderate to major impacts are on-going as a result of current aircraft overflights.

**Assumptions Regarding Emergency and Other Administrative Aircraft Use:** Park aircraft operate in the inner canyon when necessary for a variety of administrative uses (when necessary because tools or equipment for routine operations are too heavy or hazardous for mules to carry, for example), and in emergency situations; e.g., medical evacuations, search and rescue, wildland fire suppression, law enforcement, emergency maintenance, etc. This use, by its nature, is sporadic and unpredictable. For this analysis, it is assumed that these operations would continue to occur in the inner canyon on occasion, and that they would result in short-term minor to moderate adverse impacts to soundscape and visitor experience in the backcountry and along the river corridor.

#### **Alternative A – No Action**

*Direct/Indirect impacts:* Taking no action at this time would not result in any increase in anthropogenic noise levels in the project areas. Construction noise would not occur and helicopter transport would not be necessary for equipment and materials over proposed wilderness areas and to the Corridor. Other administrative use of helicopter flights, as described above, would continue. Therefore, implementation of the no action alternative would not result in any additional impacts to natural quiet, other than those already occurring from other on-going actions, as described above.

*Cumulative impacts:* Taking no action at this time, combined with past projects, planned projects (Appendix E; some of which require helicopter use in the inner canyon), on-going aircraft overflights, and on-going and future emergency aircraft use would result in a higher potential for substantial noise impacts in the area of potential effect. Therefore, helicopter use under implementation of Alternative A combined with past, on-going and future projects in the inner canyon would result in minor to moderate, intermittent short-term and long-term cumulative impacts to soundscape along the river corridor and to visitors on the canyon rims and on hiking trails within the Bright Angel FFZ. Other administrative use of helicopter flights, as described above, would continue.

*Impairment:* There would be no additional impacts to soundscape and natural quiet if Alternative A were implemented, and current anthropogenic noise levels would continue. Because natural soundscape, park solitude and visitor enjoyment values are significantly adversely affected from aircraft overflights during the high visitation season, reducing and minimizing aircraft overflights is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park (P.L. 93-620 and P.L. 100-91) ; (2) key to the natural or cultural integrity of the Park; and (3) identified as a goal in the Park's general management plan or other relevant National Park Service planning documents. No additional helicopter flights would occur

under Alternative A and this would not impair Grand Canyon National Park’s soundscape resources and pertinent Park values.

### **Alternative B – Preferred**

*Direct/Indirect Impacts:* Implementation of the preferred alternative would result in construction noise in the project areas. While mitigation measures have been developed to minimize this noise and its impacts to visitors and natural quiet, short-term adverse minor to moderate impacts would occur both in the area of potential affect along the Bright Angel Trail and at Phantom Ranch and in other project areas throughout the developed areas of the park. The methods selected for transport of equipment and supplies needed for this project at the inner canyon sites is a connected action and has the potential for adverse impacts to soundscape, particularly considering the use of helicopter flights over proposed wilderness areas and inside of the established Bright Angel FFZ. Flights are proposed for Three Mile and Pipe Creek only. Various alternate methods have also been evaluated including the use of both mules and boats, as shown in Appendix E. As stated previously, helicopter use would be minimized as much as feasible and practical. It is assumed that, for any transport option, the use of the park’s quiet technology helicopter would be used for transport of some construction materials and supplies to Three Mile and Pipe Creek, up to a total of 22 – 30 flights, each requiring an approximately 20 minute round trip from the South Rim.

To aide in the comparison of impacts of the helicopter transport methods on the park’s soundscape, a measure of cumulative time in the air is used. As discussed in the minimum requirement analysis (MRA) in Appendix E, over the course of 3 days (it is assumed it would take about 3 days to mobilize equipment/materials) the MD 900’s cumulative time in the air for Alternative B would be approximately 20–28% (20 minutes x 30 flights/36 hours); in other words, helicopters may be audible up to 20–28% of any of the three days they are operating. If other methods of transport are used whenever feasible, as discussed in the MRA in Appendix E, this cumulative time in the air would be reduced. As helicopter use exceeds the restoration of natural quiet daily goal of 25% substantial impacts from aircraft noise would occur in the area of potential effect.

While there is no alternative to some level of helicopter transport for Three Mile and Pipe Creek toilet construction (due to the remote locations of these sites and the large size and weight of some of the materials needed), methods to minimize this use are the subject of the MRA. The range in the number of flights (22 – 30 flights) is also an estimate based on preliminary estimated weights and sizes of materials. These estimates will be refined as the design for the proposed structures are refined in later planning phases for this project. This environmental assessment and the MRA included with this analysis would be reviewed for accuracy and updated if necessary when future design phases for the project are complete and current estimates are available. However, while some refinement in estimates is likely at that time, the range of flights estimated here (22 – 30) is expected to be the maximum needed, i.e. the worst-case scenario. If it is determined that substantially more flights are needed than is portrayed in this analysis, this EA and MRA will be reviewed for accuracy and continued applicability, and revised if deemed necessary.

Construction noise would occur at all project sites, including the corridor, regardless of method of transport selected and this would result in increased noise in these areas. Therefore, the use of helicopters for this alternative (assuming adherence to mitigation measures as listed in Chapter 2) would result in moderate adverse impacts to soundscape and visitors on the river corridor, South Rim, and on the corridor trails within the Bright Angel FFZ. These adverse impacts would be short-term (up to 3 days) and local. Looking at the long-term, this occasional administrative use is expected to result in minor to moderate and localized impacts to the natural soundscape of the park.

*Cumulative Impacts:* Helicopter use in the inner canyon for transport of construction materials and supplies for Alternative B combined with on-going aircraft overflights, on-going and future

emergency aircraft use, and other projects as listed in the cumulative impact section of this chapter, would result in a higher potential for substantial noise impacts in the area of potential effect. Therefore, helicopter use under implementation of Alternative B combined with past, on-going and future projects in the inner canyon would result in moderate, intermittent short-term impacts to soundscape along the river corridor and to visitors on the canyon rims and on hiking trails within the Bright Angel FFZ. If motorized boats are used for a portion of the transport for the proposed Pipe Creek toilet, this use would result in minor short-term impacts. When factored into any one year, the noise generated from any administrative helicopter use in the inner canyon under Alternative B would be adverse and moderate over the long-term and would not result in a cumulative impact that is greater than the major impacts currently occurring from aircraft overflights.

*Impairment:* There would be moderate short-term and localized, adverse, direct and indirect impacts to the natural soundscape if Alternative B is implemented. The transportation of construction materials and supplies may occur during portions of the high inner canyon backpacking visitor use period after October. This effort would be outside of the highest visitor use period on the South Rim. Because natural soundscape, park solitude and visitor enjoyment values are significantly adversely affected from aircraft overflights during the high visitation season, reducing and minimizing aircraft overflights is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park (P.L. 93-620 and P.L. 100-91) ; (2) key to the natural or cultural integrity of the Park; and (3) identified as a goal in the Park's general management plan or other relevant National Park Service planning documents. The additional intermittent use of helicopters during the project as scheduled will not impair Grand Canyon National Park's soundscape resources and pertinent Park values.

### **Alternative C – Minimized Structure at Three Mile**

*Direct/Indirect Impacts:* Alternative C proposes a smaller structure which would require fewer helicopter flights to transport materials necessary for its construction. The only difference between Alternative B and C in terms of potential for impacts to soundscape is the reduced level of proposed flights under Alternative C. Alternative C estimates approximately 17 to 25 flights for transport of materials to Three Mile and Pipe Creek. To aide in the comparison of impacts of the helicopter transport methods on the park's soundscape under Alternatives B and C, a measure of cumulative time in the air is used. As discussed in the minimum requirement analysis (MRA) in Appendix E, over the course of 3 days (it is assumed it would take about 3 days to mobilize equipment/materials) the MD900's cumulative time in the air for Alternative C would be up to approximately 16–23% (20 minutes x 25 flights/36 hours); in other words, helicopters may be audible up to 16-23% of any of the three days they are operating.. If other methods of transport are used whenever feasible, as discussed in Appendix E, this cumulative time in the air would be reduced. This cumulative air time is somewhat less than that proposed for Alternative B and does not exceed the restoration of natural quiet daily goal of 25%, minimizing the likelihood of substantial impacts from aircraft noise in the area of potential effect.

As stated for Alternative B, while there is no alternative to some level of helicopter transport for Three Mile and Pipe Creek toilet construction (due to the remote locations of these sites and the large size and weight of some of the materials needed), methods to minimize this use are the subject of the minimum requirements analysis. The range in the number of flights (17 -25 flights) is also an estimate based on preliminary estimated weights and sizes of materials. These estimates will be refined as the design for the proposed structures are refined in later planning phases for this project. This environmental assessment and the minimum requirements analysis included with this analysis would be reviewed for accuracy and updated if necessary when future design phases for the project are complete and current estimates are available. However, while some refinement in estimates is likely at that time, the range of flights estimated here (17 - 25) is expected to be the maximum needed, i.e.

the worst-case scenario. If it is determined that substantially more flights are needed than is portrayed in this analysis, this EA and MRA would be reviewed for accuracy and continued applicability, and revised if deemed necessary.

The impacts of construction noise is the same as described for Alternative B. It is important to note that, while Alternative C proposes fewer flights for construction mobilization, it would likely result in substantially more long-term maintenance needs for the structure at Three Mile. While it is still anticipated that mules would be the most feasible option for this more frequent compost removal under Alternative C, it is reasonable to assume that helicopters may become necessary for periodic compost removal in future years if park resources (staffing and availability of mules) cannot continue to meet the heightened demand. While speculative, Alternative C presumes the potential for long-term periodic compost removal using helicopters at some level. This would be a potentially long-term recurring noise disturbance, compared to a short-term, one-time construction mobilization effort under Alternative B.

Therefore, the use of helicopters for this alternative (assuming adherence to mitigation measures as listed in Chapter 2) would result in minor to moderate adverse impacts to soundscape and visitors on the river corridor, South Rim, and on the corridor trails within the Bright Angel FFZ. These adverse impacts would primarily be short-term (up to 3 days) and local, with the potential for sporadic occasional impacts from helicopters if needed for long-term maintenance of the Three Mile toilet. Looking at the long-term, this occasional administrative use is expected to result in only minor and localized impacts to soundscape in the park.

*Cumulative impacts:* Same as Alternative B

*Impairment:* Same as Alternative B

### **Conclusions**

Implementation of the no action alternative would not result in any additional impacts to natural quiet. Implementation of Alternative B would result in moderate, short-term, localized adverse impacts to soundscape and visitors on the river corridor, South Rim and corridor trails within the Bright Angel FFZ, and minor, long-term localized adverse impacts, due to the use of helicopters for transportation of construction materials. Implementation of Alternative C would result in minor to moderate, short-term, localized adverse impacts to soundscape and visitors on the river corridor, South Rim and corridor trails within the Bright Angel FFZ, and minor, long-term localized adverse impacts, due to the use of helicopters for transportation of construction materials. The maximum estimates for cumulative time in the air and percent time audible for Alternative B is estimated at 20-28% of the three days helicopters are operating, and for Alternative C is estimated at 16-23% of the three days helicopters are operating.

## **CULTURAL RESOURCES**

### Affected Environment

#### **Archeological Resources**

Only a small portion of the park has been formally surveyed for archeological sites, but more than 4,000 sites have been recorded (Horn, pers. comm. 2004). Archeologists estimate there may be as many as 61,000 sites in the park; less than 5% have been formally recorded. Archeological sites in the park appear in all ecological zones in roughly equal proportions. No one ecological zone appears to have been favored by human beings across the entire time humans have been in the canyon (NPS 1995).

Only two of the over 4,000 identified sites in Grand Canyon are on the National Register of Historic Places-The Tusayan Ruin archeological site on the East Rim and the Little Jug site west of Toroweap Valley on the North Rim. Multiple resource determinations of eligibility were completed for all prehistoric and historic archeological sites in the early 1980's (Balsom, pers. com. 2004) NPS is treating all archeological sites as if they are eligible for listing on the National Register.

South Rim – There has been no formal archeological survey of Hermit Road and Hermits Rest, although a Cultural Landscape Inventory (NPS 2003c) has been completed and a Cultural Landscape Assessment and Treatment Recommendations is expected to be completed shortly (S. Weaver, pers. comm. May 2004). Some of the densest concentrations of sites are in the Grand Canyon Village area but few of these are large, extensive sites. Tusayan Ruins is a National Register site and there are extensive remains related to late Puebloan occupation up through historic American Indian uses. There is one site in the vicinity of a proposed restroom on the South Rim that will require excavation and data recovery prior to construction. A three-hundred-foot wide corridor along East Rim Drive has been surveyed, with many sites recorded. Several of these sites contain remains of masonry structures dating before AD 1200, and many were scatters of artifacts containing both pot shards and stone chipping debris (NPS 1995a). None of these sites are in the area of potential effect for this project.

Desert View – To date, two reconnaissance level surveys have been undertaken within the Desert View area. NPS archeologists conducted a survey in 1992 and again in 1999. Both surveys identified material culture ranging from both prehistoric and historic contexts (Milner and Associated 2004). A survey has also been conducted at the Desert View campground (J. Balsom, pers. com. 2003). No archeological sites were identified in the vicinity of the Desert View campground restroom.

Cross Canyon Corridor – Bright Angel Trail and Phantom Ranch – The corridor trails were used prehistorically and pass very near many archeological sites of varying size and importance. The trails have been surveyed for archeological resources but these surveys are of poor quality. Archeological sites near trails often receive some of the greatest impacts from erosion and illicit collection. There is an archeological site in the vicinity of a proposed inner canyon toilet that will require site excavation and data recovery prior to construction. Phantom Ranch contains one well-studied pueblo with a number of features, and human burials have been found nearby. Indian Garden shows considerable evidence of Puebloan use and was also the home of several Havasupai families until well into the 20<sup>th</sup> century.

North Rim - The North Rim has some of the most important archeological sites in Grand Canyon National Park, especially in the Walhalla Glades area where surveys have located hundreds of sites (NPS 1995a). There are only three known archeological sites on the Bright Angel Peninsula (Euler 1975). Archeological surveys conducted on the peninsula over the last 20 years have not identified any additional sites, including recent surveys conducted in 2003 (Albright and Horn 2003). The settlement history for the area reflects considerable occupation during AD 1050 to AD 1150, when intensive farming occurred during the summer for approximately 100 years. Native American use of the North Rim and surrounding area is known in general terms, both from ethnographic accounts and from on-going consultation with the eight affiliated tribes of Grand Canyon. No specific references have been identified for the Bright Angel Peninsula area, but one site was located near the Widforss Trailhead area (NPS 2003d). There is a cultural landscape report for the North Rim and the results will be reviewed for any pertinent information related to the North Kaibab Trailhead area.

### **Historic Resources**

Historic properties in the park that are listed on the National Register of Historic Places consist primarily of buildings associated with tourism, park administration and operations, and mining. Additionally, 872 structures are included on the park's List of Classified Structures and 16 of these are prehistoric archeological sites.

South Rim and Desert View – Three historic districts and three historic buildings on the South Rim are listed on the National Register of Historic Places. These include the Grand Canyon Village National Historic Landmark District (which also contains four National Historic Landmark buildings), the Mary Jane Colter Historic District (which contains four National Historic Landmark buildings), the Orphan Mine (determined eligible for listing as a Historic District in 1994), the water reclamation plant, Tusayan Ruins (NPS 1995) and Yavapai Observation Station. West Rim Drive (Hermit Road) is in the process of being nominated to the National Register as an historic district (M. Anderson, pers. comm. May 2004) and a draft determination of eligibility for National Register listing for the Grand Canyon Village Mission 66 Planning Effort has been prepared (Zeman 2003).

The Mary Jane Colter Historic District (also designated a National Historic Landmark) consists of four buildings: Hopi House, Lookout Studio (both of which are in Grand Canyon Village), Hermits Rest and Desert View Watchtower. The Hermits Rest restroom is located adjacent to the Hermits Rest historic boundary and is within the area of potential affect for this building.

Yavapai Observation Station was nominated to the National Register of Historic Places in 1990. Due to its significance in relation to the development of interpretive structures within the park system, it is considered eligible for designation as a National Historic Landmark. When the building was completed in 1928, there was no restroom facility. A comfort station was added as an outbuilding at the time of the original construction. This was removed in 1959 and replaced with the current restroom facility near the parking area. The existing restrooms are adjacent to the historic property boundary and are within the area of potential affect for this building.

The term “Mission 66” refers to a 10-year design and construction initiative intended to improve park visitor services and infrastructure between 1956 and 1966. The Mission 66 era structures and buildings reflect a standardized design that was employed by numerous parks in the system including Grand Canyon. True to the Mission 66 style, restrooms feature a minimum of architectural detailing, emphasizing modern architectural style of the time, such as flat roofs and low horizontal lines. Reflecting the relatively modest budgets of the time, these restrooms are constructed of inexpensive materials and are unobtrusive (NPS letter 4/01). A determination of eligibility for the Grand Canyon Village Mission 66 Effort is currently in draft form (Zeman 2003).

The existing Yavapai restroom was constructed during the Mission 66 era. Many comfort stations (restrooms) within the park have been the recent focus of a Determination of Eligibility for National Register listing. It was recommended by NPS that the restrooms, all of the Mission 66 era, do not exhibit sufficient architectural features or historic significance to merit listing on the National Register of Historic Places (NPS 2001b) and should not be considered eligible for listing. This recommendation was submitted to the Arizona State Historic Preservation Officer (SHPO) for their review and concurrence, and they concurred that the Mission 66 era restrooms in the park are not eligible for listing on the National Register of Historic Places (AZ State Historic Preservation Office letter 3/13/01 and 4/23/01). However, SHPO is of the opinion that these structures are potentially eligible for listing on the National Register once they reach 50 years old and recommend that the Secretary of the Interior’s Standards for the Treatment of Historic Properties (Weeks and Grimmer 1995) be used to guide rehabilitation efforts at this time.

Hopi Point is located along Hermit Road, which is currently under consideration for National Register nomination. The road corridor and its associated pullouts and overlooks are all considered part of the historic property. The proposed Hopi Point vault toilet construction needs to be sensitive to this and the associated cultural landscape.

Tusayan Ruins is located along East Rim Drive and consists of significant Puebloan ruins, representing an early stage of Anasazi development. A small rock building near the ruins (Tusayan

Museum) houses an archeological museum constructed in 1932. The proposed location of the vault toilets is outside the historic property boundary.

The other South Rim and Desert View restrooms proposed for rehabilitation, installation or replacement (South Kaibab Trailhead, Yaki Point, Yaki picnic area, Shoshone Point, Grandview Trailhead, and Buggeln Hill) are not in or adjacent to any historic resources.

Cross Canyon Corridor – Bright Angel Trail and Phantom Ranch – The Cross Canyon Corridor Historic District includes 44 buildings and structures and the Bright Angel, South Kaibab, North Kaibab and connecting river trails. Some of the principal structures in the district include four trailside shelters along the Bright Angel trail and the Phantom Ranch complex at the bottom of Grand Canyon. The proposed composting toilet at Three Mile is in close proximity to one of these shelters, the Three Mile rest house and the proposed composting toilet at Pipe Creek is in close proximity to another, the Pipe Creek rest house. The placement and design of toilets near these significant historic structures, as part of the Cross Canyon Corridor Historic District, needs to be carefully done to avoid adversely impacting the trailside shelters.

The Phantom Ranch complex along Bright Angel Creek consists of approximately 20 buildings used by both the park concessionaire (Xanterra Parks and Resorts) and NPS. The five original stone buildings designed by Mary Jane Colter and constructed in 1922, comprise the heart of the complex but several other structures (cabins, dining hall, shower building, etc.) contribute to the integrity of the area. Bright Angel Campground is the site of the 1920's Civilian Conservation Corps (CCC), but the Bright Angel Campground restroom (proposed for rehabilitation) is not an historic structure. The Phantom Ranch restroom located near the confluence of Bright Angel Creek and the Colorado River is not considered part of the Cross Canyon Corridor Historic District and was constructed in 1981.

The Indian Garden complex along Bright Angel Trail is not considered as architecturally significant as those at Phantom Ranch. Structures of note include the trailside shelter, stone pumphouse (1932), and ranger residence (1932). The composting toilet proposed for rehabilitation is located in the upper end of the Indian Garden campground, is not historic, and was built in the late 1980's.

The Transcanyon Telephone Line District is about 18 miles long and roughly parallels the Bright Angel and North Kaibab Trails from the South Rim to Roaring Springs, with a spur line running 2 miles up the South Kaibab Trail. The line consists of almost 600 metal poles strung with copper-weld wire. The poles were installed in 1935, with some modifications made in 1938-1939 to provide the Park Service with its own telephone system. Proposed restroom construction or rehabilitation along the corridor is not proposed for the Line District and are not within the area of potential affect.

North Rim - Three historic districts on the North Rim are listed on the National Register of Historic Places. These include the Grand Canyon Inn (North Rim Inn) and Campground Historic District, the Grand Canyon North Rim Headquarters District, and the Grand Canyon Lodge Historic District, also designated as a national historical landmark. Neither the proposed North Kaibab Trailhead toilet nor the Widforss Trailhead toilet occurs in or adjacent to any of these districts on the Bright Angel peninsula.

### **Cultural Landscape Resources**

The *Cultural Landscapes Inventory Professional Procedures Guide* (Page 2001 prepared by the NPS defines cultural landscapes as: “settings that human beings have created in the natural world. They reveal fundamental ties between people and land—ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Cultural landscapes are intertwined patterns of things both natural and constructed—plants and fences, watercourses, and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. They are special places—expressions of human manipulation and adaptation of the land”.



Cultural Landscape Reports (CLR) have recently been completed for the North Rim Bright Angel Peninsula Developed Area (Milner and Associates 2003), Grand Canyon Village (Milner and Associates 2004a) and a CLR is in-progress for Indian Garden. A Cultural Landscape Inventory (CLI) and Treatment Recommendations has recently been completed for Desert View (Milner and Associates 2004b). A Cultural Landscape Inventory has been completed for West Rim Drive (Hermit Road), Overlooks and Trails (NPS 2003) and a Cultural Landscape Assessment/Treatment Recommendations was recently completed for Hermit Road (Milner and Associates 2004). The purposes of these documents are to identify, document, analyze, and evaluate contributing and non-contributing cultural landscape characteristics within the cultural landscape, and to provide specific recommendations and comprehensive vision for the landscape that can guide long-term management. Once completed, these documents will serve as supporting documents for implementation of the GMP. Each of these reports has been referenced for specific information related to proposed restroom rehabilitation, replacement and installations in the affected areas.

The West Rim Drive CLI (NPS 2003c) documents that Hermit Road, its associated overlooks and trail cultural landscape features are eligible for listing on the National Register of Historic Places as a district. The integrity of the landscape is classified as “medium/high” and is in “good” condition. The Hermits Rest parking area, masonry walls and curbstones along the roadway and at overlooks and pullouts are just a few of the many features that contribute to the landscape’s significance as an historic district. Restrooms proposed in this cultural landscape include Hermits Rest and Hopi Point.

The North Rim Bright Angel Peninsula Developed Area CLR (Milner and Associates 2003) recommends that portions of the North Rim developed area be considered for listing on the National Register as two new, separate historic districts; The North Entrance Road historic district and the Bright Angel peninsula historic district. The CC Hill area described in the CLR includes the North Kaibab Trailhead and parking area. This area does not contribute to the eligible North Entrance Road nor the Bright Angel peninsula and does not possess integrity. The CLR recommends that this area not be included in either district boundary at this time. The parking area was likely constructed in the 1970’s. The proposal to replace the chemical toilet in the North Kaibab Trailhead parking area would occur in this area. Widforss Trailhead was not considered part of either of these cultural landscapes.

The Desert View CLI (Milner and Associates 2004b) describes the boundary of the cultural (component) landscape as including the extent of development of tourism and park facilities in this area, including the campground area. While the campground is considered a non-contributing feature and was constructed in the 1960’s, after the period of significance, it is located within the boundary of the landscape. The CLI recommends rehabilitation of the campground. The campground restroom, proposed for rehabilitation as part of this project, was constructed in 1984 and is also considered a non-contributing feature to the cultural landscape.

The Indian Garden CLR (*in draft*, Milner and Associates 2004c) describes the campground area. Historically, the campground was located north of the gabion walls and search and rescue cache, but was moved to its current location sometime after 1989. It contains 17 campsites and consists of clusters of public and semi-private areas centered around a public space. The comfort station proposed for rehabilitation was built in 1987 and is a three-stall composting toilet with a side gable, wood-shingled roof, plywood wall panels and a wood deck. The campground area post-dates the period of significance of the cultural landscape at Indian Garden. Both restrooms in the campground are considered non-contributing features to the cultural landscape.

### **Ethnographic Resources**

Ethnographic resources are defined by the NPS as any “site, structure, object, landscape, or natural resource feature assigned traditional, legendary, subsistence, or other significance in the cultural system of a group traditionally associated with it” (Cultural Resource Management Guidelines [DO-28:191]). The lands of Grand Canyon National Park are traditionally affiliated with nine American Indian groups: Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Navajo, Paiute Indian Tribe of Utah, White Mountain Apache, San Juan Southern Paiute, and Pueblo of Zuni.

The Grand Canyon has long been of importance to native cultures and figures prominently in the origin/religious beliefs and ceremonial practices of many groups. For example, traditional Hopi and Zuni beliefs hold the Grand Canyon as the sacred place from which their ancestors emerged to the present world (NPS 2001). Although ethnographic resources significant to Native Americans may be present in the project areas, no ethnographic resources are known to exist within the vicinity of the project sites. However, recent discussions with the Havasupai Tribe have indicated potential concerns with new construction in the park, particularly in the inner canyon. Further consultation is needed with this tribe to fully understand their concerns and how they relate to the proposals in this document.

Copies of this EA will be forwarded to each affiliated tribe for review and comment. If the tribes subsequently identify the presence of additional ethnographic resources within the project areas, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of any ethnographic sites would not be made public.

### Environmental Consequences

#### **Methodology**

The baseline information used to assess impacts to cultural resources is as described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgement. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area. Additional sources of information on cultural resources used as a basis for this evaluation are as described above in the affected environment section.

All cultural resource inventories for all project areas are complete. This EA is being prepared separately from the Assessment of Effect to cultural resources form (AEF) for this project. The AEF (NPS 2004) contains a detailed analysis of the expected impacts to cultural resources from implementation of this project and contains the determinations of effect for Section 106 of the National Historic Preservation Act.

The thresholds of change for the intensity of an impact are defined as follows:

**Archaeological Resources.** The definitions for levels of impacts to archaeological resources are as follows:

**Negligible** Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Minor** Adverse – disturbance of the site(s) results in little, if any, loss of integrity. For purposes of Section 106, the determination of effect would be *no adverse effect*.  
Beneficial – maintenance and preservation of a site(s). For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Moderate** Adverse – disturbance of the site(s) results in loss of integrity. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed among National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Beneficial – Stabilization of a site(s). For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Major** Adverse – disturbance of a site(s) results in loss of integrity. For purposes of Section 106, the determination of effect would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or the Advisory Council are unable to negotiate or execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial – active intervention is undertaken to preserve the site. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Historic Resources.** The definitions for levels of impacts to historic structures or buildings are as follows:

**Negligible** impact is at the lowest levels of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Minor** Adverse – alteration of a feature(s) would not diminish the overall integrity of the resource. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial – stabilization/preservation of feature(s) in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Moderate** Adverse – alteration of a feature(s) would diminish the overall integrity of the resource. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed among National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Beneficial – rehabilitation of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Major** Adverse – alteration of a feature(s) would diminish the overall integrity of the resource. For purposes of Section 106, the determination of effect would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or the Advisory Council are unable to negotiate or execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Beneficial – restoration of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Cultural Landscapes.** The definitions for levels of impacts to cultural landscapes are as follows:

- Negligible** impact is at the lowest levels of detection with neither adverse nor beneficial consequences. For purposes of Section 106, the determination of effect would be *no adverse effect*.
- Minor** Adverse – alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be *no adverse effect*.  
Beneficial – preservation of landscape patterns and features in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes*. For purposes of Section 106, the determination of effect would be *no adverse effect*.
- Moderate** Adverse – alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be *adverse effect*. A memorandum of agreement is executed among National Park Service and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.  
Beneficial – rehabilitation of a landscape or its patterns and features in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes*.. For purposes of Section 106, the determination of effect would be *no adverse effect*.
- Major** Adverse – alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. For purposes of Section 106, the determination of effect would be *adverse effect*. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute memorandum of agreement in accordance with 36 CFR 800.6(b).  
Beneficial – restoration of a landscape or its patterns and features in accordance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties with guidelines for the treatment of cultural landscapes*.. For purposes of Section 106, the determination of effect would be *no adverse effect*.

**Ethnographic Resources.** The definitions for levels of impact to ethnographic resources are as follows:

- Negligible:** Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of beliefs and practices. There would be no change to a group’s body of beliefs and practices. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *no adverse effect*.
- Minor:** Adverse impact - impact(s) would be slight but noticeable and would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group’s body of beliefs and practices. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *no adverse effect*.

Beneficial impact - would allow access to and/or accommodate a group's traditional practices or beliefs. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *no adverse effect*.

**Moderate:** Adverse impact - impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices, even though the group's practices and beliefs would survive. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *adverse effect*.

Beneficial impact - would facilitate traditional access and/or accommodate a group's practices or beliefs. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *no adverse effect*.

**Major:** Adverse impact - impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of beliefs and practices, to the extent that the survival of a group's beliefs and/or practices would be jeopardized. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *adverse effect*.

Beneficial impact - would encourage traditional practices and/or accommodate a group's beliefs or practices. The determination of effect on Traditional Cultural Properties (ethnographic resources eligible to be listed in the National Register) for purposes of Section 106 would be *no adverse effect*.

### **Alternative A – No Action**

*Direct/Indirect Impacts:* The No Action Alternative would have no direct effect on identified cultural resources within the park. However, the no action alternative has the potential to affect cultural resources by not replacing or rehabilitating deteriorated restrooms. In many cases these are essentially incompatible structures within or near historic structures, such as the Hermits Rest restroom. This would continue minor adverse impacts to the nearby National Historic Landmark building. Continuing to use temporary chemical toilets at many locations throughout the park adversely impacts cultural landscapes in many areas and their respective viewsheds. For these reasons, implementation of Alternative A would result in minor adverse impacts to historic resources and cultural landscapes and would result in no additional impacts to archeological resources or ethnographic resources.

*Cumulative Impacts:* Historic districts and cultural landscapes near project areas have sustained previous impacts as the result of modifications to some historic buildings, roads, walkways, etc. Modern buildings have intruded on the historic setting of cultural landscapes. Furthermore, previous deterioration of some buildings as a result of natural weathering and use has compromised defining architectural characteristics. Past development of park facilities has likely impacted archaeological resources and ethnographic resources in the area. Loss or disturbance of archaeological sites (in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region) incrementally diminishes the overall understanding of Grand Canyon's cultural history. These past impacts are moderate, adverse, local, and long-term. The majority of the foreseeable future projects that have the potential to affect cultural resources have been discussed with SHPO. Consultation with SHPO and using the treatment recommendations made in the applicable CLIs as mentioned above, as the basis for future projects would ensure that any adverse effects of future projects on cultural resources would be negligible to minor. Native American groups are also contacted routinely for any proposed undertaking to ensure tribal concerns, including

ethnographic resources, are addressed. Therefore, adverse cumulative effects would be moderate, local, and long-term.

*Impairment:* Direct, indirect, and cumulative impacts to cultural resources would be negligible to moderate as a result of implementing the no action alternative. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's cultural resources or park values.

### **Alternative B – Preferred**

*Direct/Indirect Impacts:* Archeological: Implementation of Alternative B would require two archeological sites to be excavated and the data recovered as part of the project. The mitigation plan for this would be prepared in consultation with the SHPO and the affiliated tribes to ensure that impacts to these resources would not be adverse. Archeological surveys have been conducted at the other project sites and no other sites have been documented that have the potential to be disturbed, with one exception: An archeologist would be on site during construction of the Tusayan Ruins vault toilets to ensure that no archeological resources in the project vicinity would be disturbed during implementation. Other mitigation measures (Chapter 2) would be implemented to minimize the potential for adverse impacts to archeological resources. Therefore, implementation of Alternative B would result in impacts to archeological resources that are moderate, long-term and adverse.

Historical: Proposed restrooms with the potential to impact historic resources include Hermits Rest (Mary Jane Colter National Historic Landmark District at Hermits Rest), Hopi Point (potentially National Register-eligible West Rim Drive), Yavapai Observation Station (Yavapai Observation Station National Historic Landmark), Tusayan Ruins (Tusayan Museum), Three Mile and Pipe Creek (Cross Canyon Corridor Historic District and nearby historic trailside shelters), and Indian Garden, Phantom Ranch and Bright Angel Campground (within contributing developed area complexes within Cross Canyon Corridor District). Other proposed toilets at Grandview Trailhead, Yaki Point, and South Kaibab Trailhead have the potential to affect historic parking area curbstone and curb alignments and mitigation measures have been developed to minimize impacts to these historic features (see Chapter 2). None of the structures proposed for rehabilitation or replacement are historic.

Measures have been developed for the sites listed above to minimize the potential for adverse impacts to nearby historic resources. A detailed AEF has been prepared for this project that discusses the potential for impacts and efforts to minimize them. These measures are listed at the end of Chapter 2 and include such things as review and approval of architectural plans by the park's historical architect and selection of exterior finishes, roof colors, and site plans that are distinctive from but compatible with nearby historic structures. The design and placement of these toilets would be sensitive to their adjacency to these historic properties.

No character-defining features would be impacted and the integrity of nearby historic structures would not be affected. For these reasons, implementation of Alternative B would result in direct and indirect impacts to historic resources that are minor to moderate, adverse and long-term. Beneficial impacts may result with replacement of incompatible structures (Hermits Rest restroom and other temporary chemical toilets) with structures more appropriately designed for the site.

Cultural Landscapes: Proposed restrooms with the potential to impact identified cultural landscapes include Hermits Rest, Hopi Point (West Rim Drive) and South Kaibab Trailhead (as part of the South Kaibab Trail). As described in the affected environment section above, proposed restrooms at the North Kaibab Trailhead, Widforss Trailhead and Desert View campground are either outside the area

of potential affect (North Kaibab and Widforss Trailheads) or are of such limited scope (Desert View campground) that project actions would not affect cultural landscape resources.

Measures have been developed for these sites to minimize the potential for adverse impacts to surrounding landscapes. A detailed AEF has been prepared for this project that discusses the potential for impacts and efforts to minimize them. These measures are listed at the end of Chapter 2 and include such things as review and approval of architectural plans by the park's historical architect and selection of exterior finishes, roof colors, and site plans that are distinctive from but compatible with nearby historic structures and suitable for their locations within cultural landscapes. The potential for character-defining landscape features to be impacted is primarily limited to stone curbing and masonry walls around existing parking area islands. All curbing and masonry walls disturbed during construction would be replaced-in-kind and vegetation removal would be minimal. For these reasons, implementation of Alternative B would result in direct and indirect impacts to cultural landscapes that are minor to moderate, adverse and long-term. Beneficial impacts may result with replacement of incompatible structures (Hermits Rest restroom and other temporary chemical toilets) with structures more appropriately designed for the landscape.

Ethnographic Resources: While specific ethnographic resources important to Native Americans have not been formally documented in the vicinity of any of the project sites, ethnographic resources may exist, especially in the inner canyon along the Bright Angel Trail. No traditional cultural properties have been identified in the vicinity of any project sites. This project was described to all affiliated tribal groups in December 2000, requesting any comments or concerns. The Hopi Tribe responded at that time. See Chapter 5 for a detailed description of consultation activities with affiliated tribes for this project. Recent discussions with the Havasupai Tribe have indicated potential concerns with new construction in the park, particularly in the inner canyon. Further consultation will continue with this tribe to fully understand their concerns and whether any ethnographic sites would be disturbed by the proposed construction activities at any of the project sites. Copies of this EA will be forwarded to each affiliated tribe for review and comment. If the tribes subsequently identify the presence of additional ethnographic resources within the project areas, appropriate measures to mitigate the impact of the proposed work would be taken as necessary. The location of any ethnographic sites would not be made public. For these reasons, impacts to ethnographic resources from implementation of this project would be minor to moderate in intensity, adverse and long-term.

*Cumulative impacts:* Historic districts and cultural landscapes near project areas have sustained previous impacts as the result of modifications to some historic buildings, roads, walkways, etc. Modern buildings have intruded on the historic setting of cultural landscapes. Furthermore, previous deterioration of some buildings as a result of natural weathering and use has compromised defining architectural characteristics. Past development of Park facilities has likely impacted archaeological resources and ethnographic resources in the area. Loss or disturbance of archaeological sites (in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region) and ethnographic resources incrementally diminishes the overall understanding of Grand Canyon's cultural history. These past impacts are moderate, adverse, local, and long-term. Most of the foreseeable future projects that have the potential to affect cultural resources have been discussed with SHPO. Consultation with SHPO and using the treatment recommendations made in the applicable CLIs as mentioned above, as the basis for future projects would ensure that any adverse effects of future projects on cultural resources would be negligible to minor. Implementation of actions proposed under Alternative B would include multiple measures designed to minimize the potential for adverse impact to cultural resources including archeological surveys, further consultation with affiliated tribes, consultation with SHPO on design issues, preparation of an MOA with the SHPO to outline necessary consultation steps, etc.) For these



reasons, implementation of Alternative B combined with past, present and foreseeable future actions would result in moderate, short- and long-term adverse impacts to cultural resources.

*Impairment:* Direct, indirect, and cumulative impacts to cultural resources would be minor to moderate as a result of implementing Alternative B. These impacts would not result in impairment. Because there would be no major adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of Grand Canyon National Park's cultural resources or park values.

### **Alternative C – Minimized Structure at Three Mile**

*Direct/Indirect Impacts:* The primary difference between Alternative B and C is in the size of the structure proposed at Three Mile. Because the location for this restroom is the same under both alternatives and because the ultimate design of the building would be the same, impacts to cultural resources would be the same as that described under Alternative B.

*Cumulative impacts:* Cumulative impacts would be the same as Alternative B.

*Impairment:* Same as Alternative B

### **Conclusions**

Implementation of Alternative A would result in direct and indirect impacts to historic resources and cultural landscapes that are minor, adverse and long-term, direct and indirect impacts to archeological and ethnographic resources that are negligible and cumulative impacts to cultural resources that are moderate, adverse and long-term. Implementation of both Alternatives B and C would result in direct and indirect adverse impacts to archeological resources that are moderate in intensity and would be both short- and long-term, direct and indirect impacts to historic, cultural landscape and ethnographic resources that range from minor to moderate in intensity and are long-term and cumulative impacts to cultural resources that are adverse, moderate and both short- and long-term.

## **VISITOR EXPERIENCE**

### Affected Environment

Visitor experience, as it relates to this proposal, includes accessibility to visitor services (restrooms), visual quality, noise, and encounter levels, including opportunities for solitude. Other aspects of visitor experience, such as recreation opportunities and orientation would generally not be affected by the proposal.

South Rim – Grand Canyon National Park receives over four million visitors per year, the majority of which visit Grand Canyon Village on the South Rim during their stay. Grand Canyon Village presents a fast-paced, urban experience complete with many amenities found in city settings such as lodging, restaurants, bank and paved walkways. Traffic congestion and crowded facilities contributes to this urban atmosphere. The restroom included in this proposal that is closest to the Village is at Yavapai Observation Station. Yavapai Observation Station is currently used as a bookstore and an observatory for viewing the canyon. It is one of the few buildings on the rim where people can get exceptional views of the canyon and be protected during harsh weather. The building is often extremely crowded. Summer visitation can run as high as 6,000 people per day (NPS 1995). For many visitors the observation station is also an opportunity to use restrooms and get water. Long lines at the restroom during peak season are common.

Hermits Rest and Hopi Point are located along Hermit Road, the roadway that connects Grand Canyon Village to Hermits Rest along the west rim of Grand Canyon National Park. Hermit Road is a two-lane paved road approximately eight miles long, which includes approximately 7 miles of main

roadway and approximately 1 mile of scenic overlook access roads and parking areas. Currently, the park operates a shuttle bus system on this roadway for most of the year and vehicular traffic is restricted to shuttle buses, tour buses, service vehicles, and a limited number of private vehicles for visitors with accessibility needs. The road is open to all vehicle traffic during the winter (December through February). Bicyclists and pedestrians use the area year-round. A pedestrian trail exists along the rim on the north side of Hermit Road. It is paved from Grand Canyon Village to Maricopa Point, but narrow in places. Restrooms along Hermit Road are limited to Hopi Point and Hermits Rest. No other overlooks have restroom facilities. Chemical toilets are located at the shuttle bus stop at Hopi Point and a series of chemical toilets (located in one building) exists at Hermits Rest. The most frequent complaint received from visitors on the South Rim is the poor quality of the Hermits Rest restroom (J. Beshears, pers. com. 2001)

Yaki Point, South Kaibab Trailhead, Yaki picnic area, Shoshone Point, Grandview Trailhead, Buggeln Hill and Tusayan Museum are all located along East Rim Drive. East Rim Drive extends 25 miles along the canyon rim between Grand Canyon Village and Desert View. Except for a few areas, most of the drive is set back from the rim and visitors must drive to specific overlooks to see the canyon. East Rim drive offers a less congested visitor experience compared to the Village. Public transit (park shuttle bus system) is available to Yaki Point and the South Kaibab Trailhead, but the rest of East Rim Drive must be accessed via private vehicle or tour bus. Tusayan Museum introduces visitors to the area's prehistory and to later American Indian cultures in the region. The museum is too small to accommodate current visitation. The parking lot is often filled to capacity and the chemical toilets here are inadequate for the level of use during peak season. Yaki picnic area is used heavily during peak season, particularly when the road to Yaki Point and the South Kaibab Trailhead is restricted to shuttle buses only. With no restroom facility at this location, visitors use the surrounding forested areas, scattering human waste and toilet paper which results in unsanitary conditions at this popular location.

Desert View Campground – This 50-site campground is open from May through October. The campground is not a primary destination for most park campers, but many people go there when they learn that other park facilities are full. While the capacity of the restroom is adequate, the building has severely deteriorated and is need of interior and exterior repair.

Cross Canyon Corridor – Bright Angel Trail and Phantom Ranch - The corridor trails provide the main visitor access to destinations below the rim, including the Colorado River, and they connect the North and South Rims. Corridor trails include the Bright Angel, South Kaibab, North Kaibab, and the section of Tonto Trail between the Bright Angel and the South Kaibab. Day hikers, backpackers and mule riders make these routes the most heavily used of the inner canyon trails. Trailside shelters, ranger stations, restrooms, campgrounds and lodging units mark popular stopping points and help meet visitor needs. The majority of the people on the corridor trails are day hikers. These people may hike a short distance down the trails, perhaps going as far as Three Mile or Indian Garden on the Bright Angel (NPS 1995).

Grand Canyon backcountry and wilderness areas are comprised of four management zones: Cross-Canyon Corridor, Threshold, Primitive, and Wild. These zones are based on criteria including the type and amount of use, opportunity for solitude, current resource conditions, and management uses. As described above, the Corridor is a developed inner-canyon area with campgrounds and facilities. This area is not included in proposed wilderness. The Bright Angel, South Kaibab, and North Kaibab trails provide access to developed areas and act as thresholds to the wilderness use areas. Corridor trails are heavily used by day hikers and backpackers and there are high numbers of trail encounters with hikers and mule riders. There is a high probability of camping within site and sound of other groups in campgrounds. Opportunities for solitude are unlikely. Visual character of the corridor zone is a modified natural nonwilderness environment with high impact levels from heavy recreational use. Facilities (like toilets, campgrounds, shade structures, residences, etc.) are common (NPS 1988).

On the Bright Angel Trail, there is a three-stall composting toilet at Mile and a Half, providing a much-needed facility at this popular stopping point for day hikers. There is no other restroom facility along the trail until Indian Garden, approximately 3 more miles down the trail. From Indian Garden, the next toilet facility is not until Phantom Ranch restroom (near confluence of Bright Angel and Colorado River) approximately 4 more miles down the trail. There are currently no toilet facilities at Three Mile or at Pipe Creek along the Bright Angel. Three Mile is a popular day hiking destination for visitors from the South Rim and hikers are using areas behind the Three Mile rest house, resulting in unsanitary conditions. Pipe Creek along the Bright Angel is a routine stop for mule riders, backpackers, and river runners who routinely stop here to pick up and drop off passengers. Due to the combined number of South Kaibab/Bright Angel loop hikers, rim to rim hikers, rim to river day hikers on the Bright Angel, and river trip exchange passengers, more people likely pass through Pipe Creek than any other remote area in the corridor management zone (B. Wisher, pers. comm. October 2003). Hikers are using the historic rest house as a toilet, resulting in unsanitary conditions and damage to the structure. The Pipe Creek rest house used to have a potable water source. Some residual plumbing and fountain masonry still exists on the rest house. Water is available along the Bright Angel, starting at Mile and Half, Three Mile, Indian Garden and then not again until Phantom Ranch.

Phantom Ranch is the largest developed area within the inner canyon. Located along Bright Angel Creek near the confluence with the Colorado River, visitors can find camping, lodging, telephones, food service, souvenirs, restrooms, water and interpretive programs. The Phantom Ranch restroom is nearest the confluence with the river and prior to Phantom Ranch itself. Bright Angel Campground is adjacent to Phantom Ranch and Bright Angel Creek. The campground offers restrooms, water, designated camp sites, picnic tables and food lockers. Camping at the campground requires a backcountry permit.

North Rim - Approximately 10 percent of visitation to the Grand Canyon occurs at the North Rim (NPS 2002). Visitors to the North Rim encounter less traffic congestion and parking problems than visitors to the South Rim, and the North Rim provides a more leisurely pace and a more traditional park experience than the South Rim. All visitors to the Bright Angel peninsula of the North Rim pass through Jacob Lake, at the junction of Arizona 67, where the U.S. Forest Service operates a visitor contact station. Information on Grand Canyon National Park and Kaibab National Forest is available at this station. At the North Rim entrance station to the Park, each vehicle receives an official park brochure along with a copy of the North Rim edition of the park newspaper. The only other staffed interpretive facility on the North Rim is the Visitor Center, located adjacent to the Grand Canyon Lodge. The North Kaibab Trailhead is located just north of Bright Angel peninsula. The North Kaibab Trail is part of the corridor trail system, is the only maintained trail into the inner canyon from the North Rim, and is used by both mule riders and hikers. It is a popular trailhead for North Rim visitors during peak season with the parking lot filled to capacity during the summer months, with overflow parking along the roadway. One chemical toilet exists at the trailhead.

The Widforss Trailhead is accessed via a one-mile-long dirt road off of the North Rim entrance road (State Highway 67). The Trailhead is approximately 2.5 miles from Grand Canyon Lodge, and provides scenic views of Transept Canyon, terminating at Widforss Point. The trailhead area is located adjacent to proposed wilderness in a Threshold use area NF9 (NPS 1988 and NPS 1998). The Threshold zone includes approximately 24% of the wilderness use areas. Threshold areas are managed for moderate to high levels of use relative to wilderness. Camping in designated sites or at large, depending on the use area, is characteristic of threshold zones. Toilets exist at most areas. Use area limits range from six overnight campers to 40 overnight campers. Access trails to use areas are used frequently by day hikers. There is a high probability of frequent encounters with backpackers

and river users and a high probability of camping within site or sound of others during primary use periods. Opportunities for solitude often exist during non-peak periods (NPS 1988).

Visual character of the threshold zones includes a natural setting with moderate to high impacts from recreational use. Facilities (like toilets) are common in high use areas.

### Environmental Consequences

#### **Methodology**

The baseline information used to assess impacts to visitor experience is as described in the methodology section at the beginning of this chapter and includes park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgment. Detailed information on visitor use in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area. Additional sources of information on visitor experience used as a basis for this evaluation are as described above in the affected environment section.

The thresholds of change for the intensity of an impact on visitor experience are defined as follows:

**Negligible** – the impact is barely detectable, and/or will affect few visitors.

**Minor** – the impact is slight but detectable, and/or will affect some visitors.

**Moderate** – the impact is readily apparent and/or will affect many visitors.

**Major** – the impact is severely adverse or exceptionally beneficial and/or will affect the majority of visitors.

#### **Alternative A - No Action**

*Direct/Indirect impacts:* Under the No-Action Alternative, existing facilities and policies would remain in place. No changes would occur to restrooms throughout the park. Many of the restrooms would continue to decline in condition and would continue to be out of compliance with current accessibility standards. Existing chemical toilets would remain at many heavily-used visitor areas within the park. No restrooms would be installed at Yaki picnic area, Three Mile or Pipe Creek, continuing with unsanitary conditions in these frequently visited areas. Not repairing, rehabilitating or replacing existing restroom conditions would pose long-term minor to moderate adverse impacts to visitor experience within the park.

*Cumulative Impacts:* Combining implementation of past, present and reasonably foreseeable future actions with taking no action at this time for rehabilitation, replacement and installation for these 18 restrooms would result in minor adverse impacts to visitor experience over the long-term. Restroom condition would continue to deteriorate and would not provide adequate services for visitors in these high use areas. Additional temporary chemical toilets would likely need to be added in some locations to meet the demand. While other future actions would be implemented and would provide beneficial improvements in services and facilities provided to visitors (Village Interpretive Center, Greenway Trails, Bright Angel Trailhead improvements, etc.), not improving restrooms conditions would continue to adversely affect visitor experience in the park.

#### **Alternative B**

*Direct/Indirect Impacts:* Replacing restrooms and toilets that are in deteriorated and substandard conditions would result in beneficial impacts to visitors in these areas. Improvements in accessibility for persons with disabilities and bringing buildings up to current safety codes are all positive changes

in these areas. All proposed sites are in frequently used areas and are addressing current and projected future needs in these areas. Installing restrooms that adequately meet this demand would result in less need for maintenance and less potential for disturbance to visitors during servicing trips. Replacement of portable chemical toilets with permanent larger-capacity structures appropriately designed for their location would result in improvements in the visual quality of these structures, as compared to the poorly designed and temporary nature of the existing chemical toilets. Installation of new toilets in areas that current have none, but for which there is high visitor use (Yaki picnic area, Three Mile and Pipe Creek) would reduce the unsanitary conditions caused by human waste and toilet paper scattered in these areas.

Day hikers, backpackers and river users would be affected to some degree by the construction of new composting toilets at Three Mile and Pipe Creek. The experience of this segment of the visitor population in the park is different below the rim than in other places in the park. While construction of new toilets in these areas is expected to result in improved sanitation and would meet high visitor use demands, it would also result in the addition of two new permanent structures in an area that has relatively few. The resulting visual appearance of these new structures has the potential for adversely impacting visitor experience in these remote and more “pristine” inner canyon areas. Careful design and placement of the proposed buildings would take this into consideration and minimize the intrusion of these buildings on the landscape. Establishment of an accessible potable water source at Pipe Creek would result in benefits to visitors in this area. It is expected to reduce the incidence of potential dehydration and other safety/health risks for visitors who are unprepared to filter water and/or reach this location without adequate drinking water.

Short-term adverse impacts to visitor experience would occur during construction periods. Restrooms at Desert View campground, Yavapai Observation Station and Hermits Rest would likely be closed entirely during construction. Portable chemical toilets would be provided, but would likely cause some reduced level of service during the construction period. Noise impacts during construction at any of the sites has the potential to adversely impact visitors as well. Measures have been established to minimize this, such as daily curfews and seasonal restrictions in some areas, but these short-term adverse impacts are expected. Proposed helicopter flights into Three Mile and Pipe Creek would also adversely impact visitors in these areas during the construction period, as described under Soundscape. The long-term beneficial impacts from improved facilities that adequately meet the demand of visitors in high use areas outweighs the short-term adverse impacts during the construction period. For these reasons, impacts to visitor experience would be beneficial, moderate and long-term. Short-term adverse minor to moderate impacts to visitor experience are expected during the construction period.

*Cumulative Impacts:* Combining implementation of past, present and reasonably foreseeable future actions with implementation of Alternative B would result in moderate beneficial impacts to visitor experience over the long-term. Restroom conditions at these high use areas would be improved and would provided upgraded facilities for visitors in these high use areas. Combining these improvements with other planned improvements in services and facilities provided to visitors (Village Interpretive Center, Greenway Trails, Bright Angel Trailhead improvements, etc. – see Appendix D), would result in moderate beneficial cumulative impacts to visitor experience in the park.

### **Alternative C**

*Direct/Indirect Impacts:* The primary difference between Alternative B and Alternative C is in the restroom proposed for Three Mile. Impacts from Alternative C are the same as those described for Alternative B, with the exception of Three Mile on the Bright Angel Trail.

Day hikers and backpackers would be affected to some degree by the construction of a new two-stall composting toilet at Three Mile. The experience of this segment of the visitor population in the park is different below the rim than in other places in the park. The construction of a new composting toilet in this area is expected to result in improved sanitation by eliminating or at least minimizing human waste and toilet paper on the landscape. However, a smaller capacity toilet may not meet current and projected future demand for a toilet at this location. It is anticipated that a smaller two-stall composter if constructed, as proposed under Alternative C, would not fully meet the demand during the highest visitor use season and would require much more frequent maintenance than the larger capacity structure proposed under Alternative B. While Alternative C would certainly improve the existing situation, it is also likely to result in increased encounter levels between visitors and park staff (due to frequent maintenance trips), full or near-full units at certain times (resulting in odor and less than sanitary conditions during peak season) when maintenance crews cannot meet demand, and inadequate supplies (toilet paper, etc.). While any restroom at all would result in beneficial impacts to visitors in this area, the magnitude of the impact would be less for Alternative C than for Alternative B due to the capacity of the structure. The resulting visual appearance of this new structure has the potential for adversely impacting visitor experience in this remote and more “pristine” inner canyon area. Careful design and placement of the proposed building, like for Alternative B, would take this into consideration and minimize the intrusion of this building on the landscape. For these reasons, Alternative C would result in long-term direct and indirect minor to moderate beneficial impacts to visitor experience. Short-term minor adverse impacts during the construction period are as described under Alternative B. The Three Mile building proposed under Alternative C would likely take somewhat less time to construct and would require fewer helicopter flights, reducing somewhat the duration of time visitors would be adversely impacted during the implementation phase.

*Cumulative Impacts:* Same as Alternative B.

**Conclusions:** Alternative A would result in direct and indirect long- and short-term impacts that are minor to moderate in intensity and adverse, and cumulative impacts that are minor and adverse. Alternative B and C would result in minor to moderate short-term adverse impacts during construction, but long-term beneficial impacts that are moderate in intensity due to improvements in visitor restrooms. Cumulative impacts would be beneficial and moderate in intensity.

## PARK OPERATIONS

### Affected Environment

Park operations, as they relate to this proposal, refer to the adequacy of staffing levels and the quality and effectiveness of the park infrastructure in protecting and preserving park resources and providing for an effective visitor experience. Infrastructure facilities include the roads that are used to provide access to and within the park (both administrative and visitor use), housing for staff required to work and live in the park, visitor orientation facilities (visitor centers, developed and interpreted sites, and other interpretive features), administrative buildings (office and workspace for park staff), management support facilities (garages, shops, storage buildings, and yards used to house and store maintenance equipment, tools, and materials), and utilities such as phones, sewer, water, and electric.

The existing restroom facilities proposed for rehabilitation (Yavapai Observation Station, Desert View campground) require park staff to maintain them. Due to its inadequate size and state of disrepair, Yavapai restroom requires multiple trips per day by park maintenance personnel during the busiest times of the year to clean and service the facility daily. Desert View campground restroom requires daily routine visits by park maintenance personnel to clean and service the facility and to perform periodic repairs. The existing chemical toilets proposed for replacement generally have

inadequate capacity for the level of visitor use in these areas and require frequent pumping. For the busiest areas, such as Hermits Rest and Hopi Point, pumping and routine maintenance are often required on a daily basis. The areas that currently have no toilet facility but are popular visitor use areas (Yaki picnic area, Three Mile and Pipe Creek), require park personnel to clean-up and maintain these areas, requiring exposure to human waste and trash. For the inner canyon sites, these trips are frequent during the busiest seasons and require multiple trips by backcountry rangers to clean these areas up.

### Environmental Consequences

#### **Methodology**

Impacts to park operations focus on (1) employee and visitor health and safety, (2) ability to protect and preserve resources, (3) staff size, whether staffing needs to be increased or decreased, (4) existing and needed facilities, (5) communication (e.g., telephones, radio, computers, etc.), and (6) appropriate utilities (sewer, electric, water). Park staff knowledge was used to evaluate the impacts of each alternative and is based on the current description of park operations presented in the Affected Environment section of this document. Definitions for levels of impacts to park operations efficiency are as follows:

**Negligible** – a change in operations that is not measurable or perceptible.

**Minor** – a change in operations that is slight and localized with few measurable consequences.

**Moderate** – readily apparent changes to park operations with measurable consequences.

**Major** – a severely adverse or exceptionally beneficial change in park operations.

#### **Alternative A - No Action**

*Direct/Indirect Impacts:* Under the No-Action Alternative, maintenance of current restroom facilities would continue. Indirect impacts would include the increased maintenance required as existing restrooms age and deteriorate. Continuing to rely on temporary chemical toilets in high visitor use areas would require more park staff and park funding to continue to pump these frequently and to replace them when necessary. Implementing Alternative A would keep the restroom facilities in their current condition, would not add any new ones in high-visitor use areas and would continue to require park staff to clean up human waste and trash in areas with no toilet facilities. Alternative A would require multiple servicing trips to restrooms of inadequate size and condition for current and projected future visitation levels. These impacts would be moderate, long-term, and adverse.

*Cumulative Impacts:* Combining implementation of past, present and reasonably foreseeable future actions with taking no action on this project at this time would still likely result in beneficial cumulative impacts for park operations. The benefits of improved park facilities that have resulted from past and current actions as well as those planned would likely outweigh the long-term adverse impact of not upgrading the 18 restroom sites that are part of this proposal. While restroom conditions at these high use areas would continue to need improvements and would require frequent maintenance, these would be overshadowed by other areas of the park that have been improved and now require less maintenance. Thus, cumulative impacts to park operations would be minor to moderate and beneficial.



**Alternative B**

*Direct/Indirect Effects.* Upgrading 15 sites that are either inadequate or in need of rehabilitation, would provide much needed improvements in visitor facilities, which would directly relate to beneficial impacts to park operations. The upgrading of these facilities and the design of structures to meet current and projected future demand would result in substantially fewer maintenance trips to each of these sites, estimated at up to 80% fewer maintenance trips to the busiest locations such as Hermits Rest and Hopi Point. The need for periodic repairs for Yavapai and Desert View Campground restrooms would be reduced to a bi-annual or annual basis. This would have indirect benefits to the maintenance staff of the park by reducing labor costs and the cost of necessary materials and supplies.

The construction of three new restrooms would add to the number of facilities in the park that require maintenance and upkeep, and would require routine maintenance and servicing. This would be most visible and measurable with the addition of new restrooms in the inner canyon at Pipe Creek and Three Mile, substantially increasing the maintenance needs for these areas by park staff. Due to the remoteness of these two sites and the limited staff assigned to the current program, yearly compost removal would need to occur via helicopter. If additional staff are added to the inner canyon toilet maintenance program to keep up the increase in new facilities, maintenance would occur via mule and would require an addition of 14 days with 2 people each to periodically empty/remove compost from these toilets. The increase in operations required for Alternative B is outweighed by the expected benefit to park resources this would achieve, by eliminating human waste and litter in these popular areas and minimizing damage to existing structures. Providing a potable water source at Pipe Creek would also benefit park operations by providing backcountry rangers and other staff with access to water that can be used during emergency responses to visitors in this area.

*Cumulative Impacts:* Combining implementation of past, present and reasonably foreseeable future actions with implementation of Alternative B would result in moderate beneficial impacts to park operations over the long-term. Restroom conditions at these high use areas would be improved and would provided upgraded facilities for visitors, minimizing the need for routine maintenance and periodic emptying/removal trips. Implementation of the recent backcountry toilet installation, rehabilitation and maintenance program has also added maintenance needs to the current backcountry toilet maintenance program. Combining these past and current improvements with other planned improvements in services and both visitor and park facilities, would result in moderate beneficial cumulative impacts to park operations. This is with the caveat that the backcountry toilet maintenance program increases in funding and staff size to accommodate the annual and routine maintenance needs created by two new facilities in the inner canyon.

**Alternative C**

*Direct/Indirect Effects.* The primary difference between Alternative B and C is in the restroom constructed at Three Mile. The construction of a smaller structure that would not adequately meet the current or future demand is expected to result in the need for more frequent maintenance trips. These mule trips are costly and are labor-intensive, taxing the program of inner canyon toilet maintenance staff. Combining the beneficial impacts expected from the improvements in the other 17 sites under Alternative B would outweigh the impact this may have on one aspect of the maintenance program. For these reasons, impacts to overall park operations would continue to be beneficial but would be minor to moderate in intensity and long-term. It is also anticipated that the smaller structure, requiring more maintenance trips, would be periodically emptied using helicopter flights, due to the fact that the current program does not have adequate funding or staff to accommodate the addition of two new inner canyon facilities and would not have adequate time or staffing to accomplish these increased compost removal needs using mules.

*Cumulative Impacts.* Same as Alternative B

**Conclusions**

Alternative A would result in direct and indirect impacts to park operations that are both short- and long-term, adverse and moderate in intensity, and cumulative impacts that are minor to moderate and beneficial. Alternative B would result in direct, indirect and cumulative impacts that are beneficial, long-term and moderate in intensity. Alternative C would result in direct and indirect impacts that would be minor to moderate in intensity and beneficial, with cumulative impacts that are moderate and beneficial. While overall beneficial impacts are expected with improvements in restroom facilities under both Alternative B and C, it is important to point out that adverse impacts to the inner canyon toilet maintenance program would be realized under both action alternatives, unless additional funding is allocated and additional staff are hired to accommodate the increased work load to perform weekly cyclic maintenance for the two new facilities and yearly compost removal. Combining these new facilities on to the workload of the already taxed program would necessitate additional staff and program funding.

## Chapter 4 – List of Preparers

### **Prepared By:**

Deborah Lutch, Natural Resource Specialist - Project Management Team, Grand Canyon National Park

### **NPS staff contributing information to the preparation of this document includes:**

#### **Grand Canyon National Park**

##### **Project Management Team – Flagstaff, AZ**

Brad Traver, former Project Management Team Leader

Vicky Stinson, Landscape Architect - Fee Demo Program Manager and Project Manager

Gigi Wright, Graphics

Susan Weaver, Cultural Resource Specialist

Michael Terzich, Landscape Architect and acting Park Accessibility Coordinator

Robert Powell, Historical Architect

##### **Science Center – Grand Canyon, AZ**

Jeffrey Cross, Science Center Division Chief

Janet Balsom, Cultural Resources Branch Chief

R.V. Ward, Wildlife Program Manager

Elaine Leslie, Wildlife Biologist

Linda Jalbert, Outdoor Recreation Planner, Wilderness Planner

Ken McMullen, Soundscape and Aircraft Overflights Program Manager

Sarah Falzarano, Aircraft Overflights Program

John Rihs, Hydrologist

Lori Makarick, Inner Canyon Vegetation Program Manager

Carl Bowman, Air Quality Specialist

Sara White, Compliance Officer

Jill Beshears, Compliance Specialist

##### **Facility Management Division – Grand Canyon, AZ**

John Beshears, Chief, Facilities Management

Peter Steinkopf, Solid Waste and Sanitation

Vanya Pryputniewicz, Backcountry Toilet Maintenance

Bill Allen, Trails Supervisor

Rachel Stanton, Environmental Protection Specialist

Chuck Griffiths, Mechanical and Custodial Supervisor

Mike Anderson, Trails and Roads Historian

##### **North Rim– North Rim, AZ**

Phil Walker, North Rim Unit Manager

Jim Boucher, Facility Manager

##### **Visitor and Resource Protection Division – Grand Canyon, AZ**

Mike Minton, Helicopter Manager

Mary Murray, Assistant Helicopter Manager

Jim Kitchen, Suppression Manager

**Denver Service Center – Denver, CO**

Jack Hagan, Job Captain

Kate Hammond, Project Manager

Jim Pennington, Civil Engineer

Paul Cloyd, Project Manager

## Chapter 5 – Consultation with Others

### **Public Involvement**

The NPS sent a public scoping letter, describing the parkwide restroom rehabilitation proposal, to an approximately 300-person mailing list on 8 December 2000. This letter was also posted on the park's website. Comments in response to the scoping letter were received from the following: United States Fish and Wildlife Service, which provided a species list; the Hopi Tribe offering no specific comment; and one from Nava-Hopi Gray Line Tours agreeing with the need for action.

An additional public scoping letter, describing several projects proposed for the North Rim, including replacement of chemical toilets at the North Kaibab Trailhead and Widforss Trailhead, was submitted to this same park mailing list on November 29, 2000. This letter was also posted on the park's website. Four comments were received including one from the Zuni Heritage and Historic Preservation Office offering no specific comment; one from the National Tour Association offering support for North Rim projects; one from Five County Association of Governments offering support for North Rim projects; and one from the Kaibab Band of Paiute Indians stating that restrooms should be located within disturbed areas, should avoid archeological and other cultural sites and should not be constructed near overlooks.

### **Arizona Game and Fish Department**

NPS staff met with personnel from AGFD on 13 December 2000 to discuss this preliminary proposal and several other future proposals. A list of species of concern for the Park was discussed at this meeting.

### **U.S. Fish and Wildlife Service**

NPS staff met with personnel from USFWS on 13 December 2000 to discuss this preliminary project proposal and several other future proposals. A list of species of concern for projects was discussed at this meeting. NPS staff met with USFWS several times between March and June 2002 to discuss this project proposal in conjunction with a batch consultation for several construction projects throughout the Park, including the restroom rehabilitation and replacement proposal. Concurrence on the batch consultation was received from USFWS on 9 July 2002 and indicated that the projects may affect but are not likely to adversely affect the Mexican spotted owl and the California condor. Two proposed sites were not included in the batch consultation (Pipe Creek and Yaki Picnic Area) and are the subject of a separate biological assessment (NPS 2004).

### **Tribal Groups**

The NPS sent scoping letters on 8 December 2000 to eight tribal groups. Although nine tribal groups have interests in the Park, only eight ask to be consulted on projects outside the river corridor. As described above, the Hopi Tribe responded but offered no specific comment, but requested a meeting. The NPS also sent scoping letters to eight tribal groups describing North Rim projects on 29 November 2000. As described above, the Zuni Heritage and Historic Preservation Office responded, but offered no specific comment and the Kaibab Band of Paiute Indians responded, stating that restrooms should be located within disturbed areas, should avoid archeological and other cultural sites and should not be constructed near overlooks. The Havasupai Tribe was contacted in June 2004 at the request of the park's Chief of Cultural Resources, to discuss the restroom proposals and determine if they might have concerns. The Havasupai had expressed concern previously with a past park project to construct a new restroom along the Bright Angel Trail. The tribe did express concern during phone conversations with the park in June – July 2004 with new construction in the park and wanted further discussion to occur between the park and the tribe. Attempts to set up a meeting with the tribe have so far proved unsuccessful. A copy of this EA will be sent to all affiliated tribes, including the Havasupai, and further discussions will occur, as needed, to ensure tribal concerns are addressed.

**State Historic Preservation Office**

The NPS sent these same scoping letters to SHPO on 8 December 2000 and 29 November 2000. An assessment of effect (AEF) is being prepared separately for this project and will form the basis for consultation with the SHPO. In addition, a memorandum of agreement (MOA) between the park and the SHPO is currently being developed in consultation with SHPO and the Advisory Council on Historic Preservation to outline further coordination and consultation needs for this project through its implementation.

## SELECTED REFERENCES

### Executive Orders

Executive Order 11988 (Floodplain Management)

Executive Order 12898 (Environmental Justice)

Executive Order 13186 (Migratory Birds)

### NPS Director's Orders

DO-2 Park Planning

DO-12 Conservation Planning, Environmental Impact Analysis and Decision Making

DO-28 Cultural Resource Management

DO-41 Wilderness Preservation and Management

DO-47 Sound Preservation and Noise Management

DO-55 Implementation of the NPS Organic Act

DO-65 Explosives Use and Blasting Safety

NPS-28 Cultural Resources Management Guideline

NPS-77 Natural Resources Management Guideline

DO-77-1 Wetland Protection

DO-13 Environmental Leadership (DRAFT)

### US Federal Government and State Government

36 CFR 800.11

40 CFR, Part 503

1864 Act of Congress (13 Stat. 325)

1890 Act of Congress (26 Stat. 650)

1906 Joint Resolution of Congress (34 Stat. 831)

1955 Federal Air Quality Law

1963 Clean Air Act, as amended

1964 Wilderness Act

1966 National Historic Preservation Act

1969 National Environmental Policy Act (NEPA)

1973 Endangered Species Act, as amended

1977 Clean Water Act

- 1979      Archeological Resources Protection Act
- 1987      National Parks Overflight Act (Public Law 100-91)
- 1988      Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. Office of Water, EPA 832-R 92-005. Washington, DC.
- 1990      Native American Graves Protection and Repatriation Act
- 1995      Programmatic Agreement among the National Park Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Draft General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona.
- 1996      Endangered and Threatened Wildlife and Plants: Establishment of a Nonessential, experimental population of California condors in Northern Arizona. Federal Register, October 16, 1996. Volume 61, Number 201, pages 54043-54060.
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## APPENDIX A

### Grand Canyon General Management Plan (1995)

#### Excerpts Pertaining to Parkwide Restroom Rehabilitation and Replacement

##### Management Objectives (Page 7 – 8)

The management objectives for Grand Canyon National Park, which are based on the park visions, set the direction for future park management. The objectives describe desired conditions to be achieved.

##### International Significance

- Manage the park to preserve its integrity as a world heritage site with natural and cultural resources of national and international significance.

##### Natural And Cultural Resources

- Preserve, protect, and interpret the park's natural and scenic resources and values, and its ecological processes.
- Preserve, manage, and interpret park cultural resources (archeological, ethnographic, architectural, and historic resources, trails, and cultural landscapes) for the benefit of present and future generations.
- Preserve, protect, and improve air quality and related values such as visibility.
- Manage visitor use, development, and support services to protect the park's resources and values.
- Preserve and protect the genetic integrity and species composition within the park, consistent with natural ecosystem processes.
- To the maximum extent possible, restore altered ecosystems to their natural conditions. In managing naturalized ecosystems, ensure the preservation of native components through the active management of nonnative components and processes.
- Manage ecosystems to preserve critical processes and linkages that ensure the preservation of rare, endemic, and specially protected (threatened/endangered) plant and animal species.
- Protect the natural quiet and solitude of the park, and mitigate or eliminate the effects of activities causing excessive or unnecessary noise in, over, or adjacent to the park.
- Preserve natural spring and stream flows and water quality. Withdraw only the minimum water necessary to meet park purposes. To the maximum extent feasible, strive to meet increases in water demand by conserving and reusing water.
- Provide opportunities for scientific study and research focused on the Grand Canyon, consistent with resource protection and park purposes.
- Inventory, monitor, and maintain data on park natural and cultural resources and values, and utilize this information in the most effective ways possible to facilitate park management decisions to better preserve the park.
- Clearly delineate and maintain the park boundary to protect park resources and values.
- Identify and evaluate all cultural properties within the park for inclusion on the National Register of Historic Places.
- Collect ethnographic data and develop ethnohistories for the Havasupai, Hopi, Hualapai, Navajo, Southern Paiute, and Zuni peoples concerning their associations with the Grand Canyon, as appropriate, in order to preserve, protect, and interpret park resources and values.

important to diverse American Indian cultures, including significant, sacred, and traditional use areas.

### Visitor Experience

- Provide a diverse range of quality visitor experiences, as appropriate, based on the resources and values of the Grand Canyon, compatible with the protection of those resources and values.
- Provide access that is appropriate and consistent with the character and nature of each landscape unit and the desired visitor experience.
- Consistent with park purposes and the characteristics of each landscape unit, preserve and protect the maximum opportunities in every landscape unit of the park for visitors to experience the solitude, natural conditions, primitiveness, remoteness, and inspirational value of the Grand Canyon.
- Provide equal access to programs, activities, experiences, and recreational opportunities for individuals with disabilities, as appropriate and consistent with the levels of development and inherent levels of access in areas within the park.
- Provide a wide range of interpretive opportunities and information services to best assist, inform, educate, and challenge visitors.
- Educate and influence the public through positive action to preserve and protect the world they live in, including but not limited to the park.
- Provide a safe, efficient, and environmentally sensitive transportation system for visitors, employees, and residents, consistent with management zoning and resource considerations. Emphasize nonmotorized modes of transportation wherever feasible.
- Develop visitor use management strategies to enhance the visitor experience while minimizing crowding, conflicts, and resource impacts.
- Provide visitor and employee facilities and services, as necessary and appropriate, in or adjacent to areas dedicated to those uses or in appropriate disturbed areas.

### Facility Design

- Consistent with its purpose, strive to make Grand Canyon National Park a model of excellence in sustainable design and management through such means as energy efficiency, conservation, compatibility with historic setting and architecture, recycling, accessibility, and the use of alternative energy sources.
- Encourage appropriate use and adaptive reuse of historic structures, while preserving historic integrity.
- Ensure that development and facilities within the park are necessary for park purposes.
- Design high-quality facilities that exemplify visual consistency and appropriateness.
- Ensure that park developments and operations do not adversely affect park resources and environments, except where absolutely necessary to provide reasonable visitor access and experiences.

## APPENDIX B

### Compliance

The following laws and associated regulations provided direction for the design of project alternatives, the analysis of impacts and the formulation of mitigation/avoidance measures:

**National Environmental Policy Act of 1969 (NEPA) (Title 42 U.S. Code Sections 4321 to 4370 [42 USC 4321-4370]).** The purposes of NEPA include encouraging "harmony between [humans] and their environment and promote efforts which will prevent or eliminate damage to the environment. . .and stimulate the health and welfare of [humanity]". The purposes of NEPA are accomplished by evaluating the effects of federal actions. The results of these evaluations are presented to the public, federal agencies, and public officials in document format (e.g., environmental assessments and environmental impact statements) for consideration prior to taking official action or making official decisions. Implementing regulations for the NEPA are contained in Part 1500 to 1515 of Title 40 of the U.S. Code of Federal Regulations (40 CFR 1500-1515).

**Clean Water Act of 1972, as amended (CWA) (33 USC 1251-1387).** The purposes of the CWA are to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". To enact this goal, the U.S. Army Corps of Engineers (Corps) has been charged with evaluating federal actions that result in potential degradation of waters of the U.S. and issuing permits for actions consistent with the CWA. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the U.S. Implementing regulations describing the Corps' CWA program are contained in 33 CFR 320-330.

**Clean Air Act (PL chapter 360, 69 Stat 322, 42 USC 7401 et seq.).** The main purpose of this act is to protect and enhance the nation's air quality to promote the public health and welfare. The act establishes specific programs that provide special protection for air resources and air quality related values associated with NPS units. The U.S. Environmental Protection Agency has been charged with implementing this Act.

**Endangered Species Act of 1973, as amended (ESA) (16 USC 1531-1544).** The purposes of the ESA include providing "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved". According to the ESA, "all Federal departments and agencies shall seek to conserve endangered species and threatened species" and "[e]ach Federal agency shall. . .insure that any action authorized, funded, or carried out by such agency. . .is not likely to jeopardize the continued existence of any endangered species or threatened species". The U.S. Fish and Wildlife Service (non-marine species) and the National Marine Fisheries Service (marine species, including anadromous fish and marine mammals) administer the ESA. The effects of any agency action that may affect endangered, threatened, or proposed species must be evaluated in consultation with either the USFWS or NMFS, as appropriate. Implementing regulations which describe procedures for interagency cooperation to determine the effects of actions on endangered, threatened, or proposed species are contained in 50 CFR 402.

**National Historic Preservation Act of 1966, as amended (NHPA) (16 USC 470 et sequentia).** Congressional policy set forth in the NHPA includes preserving "the historical and cultural foundations of the Nation" and preserving irreplaceable examples important to our national heritage to maintain "cultural, educational, aesthetic, inspirational, economic, and energy benefits". The NHPA also established the National Register of Historic Places composed of "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture". The NHPA requires that federal agencies take into account the effects of their actions on properties eligible for or included in the National Register of Historic Places and coordinate such actions with State Historic Preservation Offices (SHPO). NHPA also requires federal agencies, in consultation with the SHPO, to locate, inventory, and nominate all properties that appear to qualify for the National Register of Historic Places, including National Historic Landmarks. Further, it requires federal agencies to document those properties in the case of an adverse effect and propose alternatives to those actions, in accordance with the NEPA.



**APPENDIX C****Photos of Existing Restrooms and Proposed Restroom Locations**

Photo 1. Yavapai Observation Station comfort station, Grand Canyon National Park, August 2003.



Photo 2. Desert View Campground comfort station, Grand Canyon National Park



Photo 3. Phantom Ranch comfort station, Grand Canyon National Park, April 2003.



Photo 4. Bright Angel Campground comfort station, Grand Canyon National Park, April 2003.





Photo 5. Hermits Rest restroom, Grand Canyon National Park, July 2003.



Photo 6. Hopi Point chemical toilets, Grand Canyon National Park, July 2003.



Photo 7. South Kaibab Trailhead chemical toilets, Grand Canyon National Park, August 2003.



Photo 8. Yaki Point chemical toilet, Grand Canyon National Park, August 2003.





Photo 9. Shoshone Point chemical toilets, Grand Canyon National Park, August 2003.

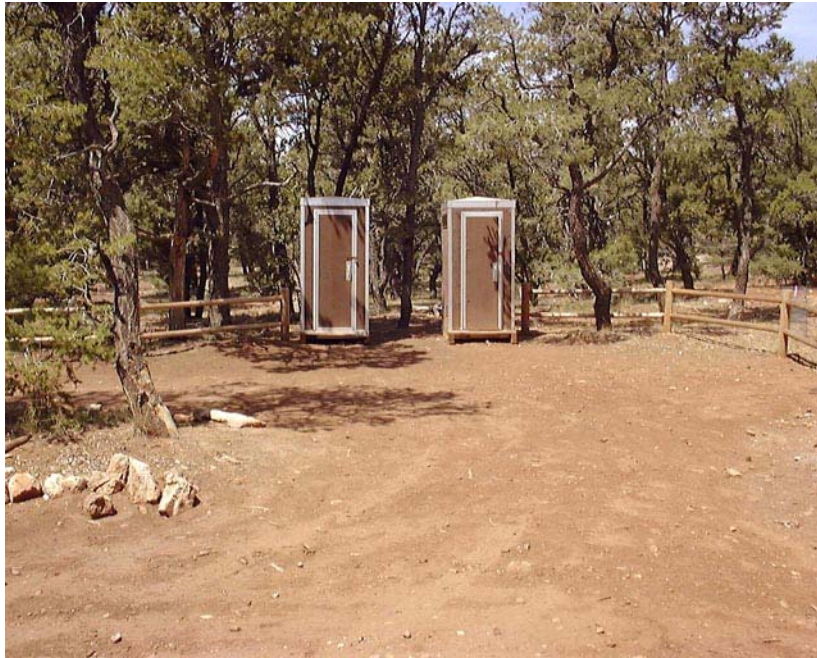


Photo 10. Grandview Trailhead chemical toilets, Grand Canyon National Park, August 2003.



Photo 11. Buggeln Hill Picnic Area chemical toilet, Grand Canyon National Park, August 2003.



Photo 12. Tusayan Museum chemical toilets, Grand Canyon National Park, August 2003.





Photo 13. North Kaibab Trailhead chemical toilet, Grand Canyon National Park, 2002.



Photo 14. Widforss Trailhead chemical toilet, Grand Canyon National Park

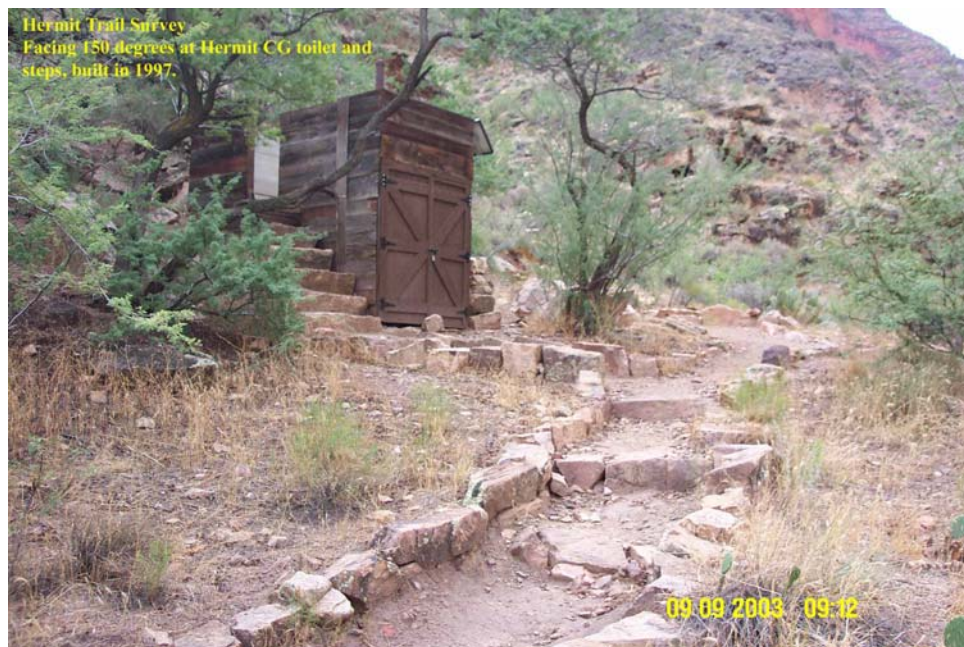




Photo 15. Existing composting toilet at Mile and Half along the Bright Angel Trail, Grand Canyon National Park.



Photo 16 Existing composting toilet at Hermit Campground, Grand Canyon National Park.





## APPENDIX D

### Wildlife Species Descriptions

**Mexican Spotted Owl – Threatened** - The Mexican spotted owl (MSO; *Strix occidentalis lucida*) was listed as a threatened species in March 1993, and a recovery plan was issued in 1995. MSO typically breed and roost in deep canyon or diverse forested habitats. They are associated with late seral forests and are generally found in habitat that includes mixed conifer and pine-oak forests, riparian madrean woodland, and sandstone canyonlands (USFWS 1995). However, MSO have been found in relatively open shrub and woodland vegetation communities in arid canyonland habitat (Willey 1995). Nesting habitat is typically in areas with complex forest structure or rocky canyons containing mature or old growth stands that are uneven-aged and multi-storied with high canopy closure. MSO usually nest in abandoned stick nests or in cavities in trees or cliffs. Tree nests can be on platforms such as old raptor nests or witches' brooms formed by dwarf mistletoe (*Arceuthobium* sp.) or in cavities formed by broken-off branches or tree tops. Nests in rock canyon areas are usually in cavities in the rocks or in caves (Ganey and Dick 1995).

The diet of the MSO varies depending on location and habitat. Generally it consists of small and medium-sized mammals such as peromyscid mice, voles (*Microtus* spp.), pocket gophers (*Thomomys* spp.), ground squirrels (*Spermophilus* spp.), and woodrats (*Neotoma* spp.). Woodrats are the most common and important prey item range-wide, as measured in frequency in the owls' diet and in biomass consumed (Ward and Block 1995). Other animals that may occasionally be consumed include small birds (usually Passeriformes), lizards (*Sceloporus* spp.), bats (Chiroptera), beetles (Coleoptera), and rabbits (*Sylvilagus* spp.). MSO use a wider variety of forest conditions when foraging than when nesting or roosting, and a diverse prey base is dependant on the availability and quality of diverse habitats. Spotted owls typically forage at night, although diurnal foraging has also been observed.

**Data Sources:** The presence of MSO within Grand Canyon National Park was confirmed in 1992 through field surveys of approximately 2,430 ha (6,000 acres) of suitable habitat on the North and South Rims. Additional MSO surveys occurred in 1994 and 1995 along the South Rim and in 1998 and 1999 along the North Rim. These surveys did not detect any spotted owls. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and responses were received at six locations. Surveys continued along the river corridor in 2001, with new owls located (Willey and Ward, in prep.). An extensive owl survey was initiated in 2001 with crews surveying the inner canyon and river corridor, owl habitat below the North and South Rims, and portions of the North and South Rim plateaus. A second year of surveys for these same areas was completed in 2002. Surveys continued along the North and South Rims, in some areas in the inner canyon and on the plateaus of the North Rim in 2003 and are expected to continue in 2004.

Critical habitat for MSO was designated in 2001 and includes most of the Park except the South Rim. Owl habitat in Grand Canyon National Park is cool canyon habitat defined as areas with low thermal intensity, short thermal duration, and steep slopes (Spotskey and Willey 2000). Predicted habitat has been spatially defined through a geographic information system (GIS) model and may or may not include forested habitat; i.e., the coolness and short thermal duration may be a result of vertical rock faces, cliff walls, and aspect and not necessarily because an area has dense vegetative canopy cover.

The size and extent of the MSO population at Grand Canyon is currently unknown. However, survey results suggest that MSO occupy the rugged canyonland terrain within the Grand Canyon.

Detections of MSO indicate they are utilizing small stringers of Douglas-fir trees below the rim (D. Spotskey, NPS, pers. com., May 23, 2000). No MSO are known from the plateau areas of the Park.

The Park falls within the Colorado Plateau Recovery Unit. The Mexican Spotted Owl Recovery Plan (USFWS 1995) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Approximately 40 MSO Provisional Protected Activity Centers (PACs) have been designated for known MSO locations in the Park as of 2002 (Spotskey pers. comm., 9/5/02). Protected habitat in the Colorado Plateau Recovery Unit includes any PACs, designated wilderness areas, and any mixed conifer forests on slopes over 40%. Restricted habitat in the Colorado Plateau Recovery Unit includes mixed conifer forests or riparian habitats that have primary constituent elements. Primary constituent elements in these habitat types include high basal area of trees, uneven-aged structure, and high snag basal area. Primary constituent elements in canyon habitat include cooler and more humid conditions than in the surrounding area; clumps or stringers of trees; canyon walls with crevices, ledges or caves; high percent cover of ground litter or woody debris; and riparian or woody vegetation.

As described in Chapter 3, spotted owls have been detected in the vicinity of several proposed restroom sites including several areas below the Rim along East Rim Drive, near Hermits Rest along West Rim Drive, near Desert View and near Indian Garden in the inner canyon. No restrooms, however, are located within critical habitat for MSO, or in habitat considered suitable for nesting or roosting. Effects of implementation of this project on MSO would primarily be the result of potential construction noise disturbance on nearby MSO protected activity centers.

**Threats.** The primary threats cited for the owl in most Recovery Units include large-scale catastrophic wildfire and timber harvest. Potential threats cited specifically for the Colorado Plateau Recovery Unit focus more on recreational impacts, road building, and overgrazing.

**California Condor – Threatened** – California condors (*Gymnogyps californianus*) are large birds that reach sexual maturity by 5-6 years of age. They are strict scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Without the guidance of their parents, young inexperienced juveniles may also investigate human activity. As young condors learn and mature this human-directed curiosity diminishes.

The California condor was listed as an endangered species in March 1967. In 1996, the USFWS established a nonessential, experimental population of California condors in northern Arizona. In December 1996 the first condors were released in the Vermillion Cliffs area of Coconino County, Arizona, approximately 48 km (30 miles) north of Grand Canyon National Park. Subsequent releases have occurred in May 1997, November 1997, November 1998, December 1999, February 2002 and December 2002 in the same vicinity and in the Hurricane Cliff area, which is about 96 km (60 miles) west of Vermillion Cliffs. By declaring the population “nonessential, experimental”, the USFWS can treat this population as “threatened” and develop regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between the management of the condors and other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species (NPS 1991).

Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, and potholes. Most California condor foraging occurs in open meadows and throughout the forested areas of the rims. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Roost sites include cliffs and tall trees, including snags (61 FR 54043-54060).

**Data Sources.** As of April 2004, the population of free-flying condors in Arizona totaled 45. All of the California condors in northern Arizona are fitted with radio transmitters that allow field biologists to monitor the condors' movements. Condors have been observed as far west as the Virgin Mountains near Mesquite, Nevada; south to the San Francisco Peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, and the Village to Hermits Rest. During the summer/fall of 2002, the North Kaibab National Forest was used frequently for perching, roosting and foraging. Potential nesting habitat exists throughout the Park. One nesting attempt was documented in the Marble Canyon area in 2001. Two nest sites on the South Rim, one on The Battleship and one on Dana Butte, were initiated in 2002. Both nest sites failed. In 2003, a condor chick hatched in the Salt Creek drainage area, the first condor born in the wild since reintroduction efforts began. Active nests sites as of May 2004 include a site near the Vermillion Cliffs and the Battleship formation. All nest sites at this time are located greater than 1 mile from any proposed project area. It is unclear whether condors would select nesting areas in close proximity to developed portions of the Park.

**Threats.** The main reason for the decline of condors was an unsustainable mortality rate of free-flying birds combined with a naturally low reproductive rate. Most deaths in recent years have been related to human activity. Shootings, poisonings, lead poisoning, and power line collisions are considered the condor's major threats.

**Bald Eagle – Threatened** – Bald eagles occur in Arizona as either breeding populations or winter migrants. Arizona bald eagles occur at elevations between 460 and 7,390 feet. Nests occur in tall trees, cliff faces, ledges, and pinnacles near open water for foraging. Perches for shelter, roosting, foraging and guarding are important habitat components. Their diet is comprised mainly of fish, with small mammals, carrion, birds and reptiles eaten to a lesser extent (AGFD 1997). Nesting occurs along central Arizona rivers including the Salt River and Verde Rivers. New nest sites along the Gila, Bill Williams, Agua Fria, and San Pedro drainages indicate that the Arizona population is increasing. Since 1992, nearly 250 wintering bald eagles have been observed each year in Arizona, with most occurring close to water in coniferous forests near Flagstaff and the White Mountains (AGFD 1996). Bald eagle nesting does not occur within Grand Canyon National Park, but wintering eagles are often seen within park boundaries.

**Data Sources.** A Recovery Plan for the Southwest population was completed in September 1982. The Southwest population was downlisted from Endangered to Threatened status in 1995 (60 FR 36000, July 12, 1995) and is now under consideration for removal from the Endangered Species list. Delisting was proposed in 1999 (64 FR 36454 July 6, 1999). Bald eagles are known to occur in the park during the winter. Three sites have been identified as winter roost areas: Nankoweap Creek near its confluence with the Colorado River, Bright Angel Creek near Phantom Ranch and a site near Twin Overlooks, along East Rim Drive on the South Rim. The restroom in Bright Angel Campground is within 0.25 miles of known winter roosts for bald eagles. Guidelines for management of wintering bald eagles provide a source of information (Martell 1992) for agencies.

**Threats.** Threats to the bald eagle include shooting, entanglement in monofilament fishing line and tackle; inundation of nests, human disturbance at nests, toxic level of heavy metals (mercury) in prey, and loss of native riparian and aquatic habitats essential to foraging and nest replacement (AGFD 1996).

**Peregrine Falcon (Species of Concern – Delisted)** – In the southwest region, peregrines persist mainly on mountain cliffs and river gorges. Eyries exist on dominant cliffs that generally exceed 200

feet in height; nests are usually situated on open ledges. Peregrines formerly nested in nearly all of the plant communities of the region. Prey abundance and diversity provided by these situations is probably a major factor in eyrie selection. Nest sites are often adjacent to water courses and impoundments because of the abundance of avian prey. Peregrines may travel up to 17 miles from nesting cliffs to hunting areas. Preferred hunting habitats include cropland, meadows, river bottoms, marshes, and lakes. Prey species may include, but are not limited to, blackbirds, jays, doves, shorebirds, and smaller songbirds. As of 1993, breeding was documented at more than 180 sites in Arizona.

**Data Sources.** Extensive surveys have been conducted over the years in Grand Canyon National Park by park biologists and U.S. Geological Survey/BRD personnel. The Grand Canyon provides excellent cliff nesting habitat for peregrines and numerous eyries have been documented within the park. In a Draft Addendum to the Recovery Plan, the Fish and Wildlife Service recommended delisting of the southwestern regional population because the recovery goals outlined in the 1984 Plan have been met. A monitoring program is being developed by the U. S. Fish and Wildlife Service to guide monitoring activities following delisting. An initial goal of monitoring at least 25 peregrine territories in the Colorado Plateau and adjacent low desert regions is part of this nation-wide effort. Grand Canyon National Park has not been contacted to date on participation in this monitoring effort. Due to the size and extent of the population within the park, participation in the monitoring program is likely. Peregrine eyries occur in proximity to restrooms proposed at Desert View campground, Buggeln Hill, Yaki Point, South Kaibab Trailhead, Yavapai Point and Hopi Point.

**Threats.** Previous peregrine population declines coincided with the increasing use of DDT, but other limiting factors included availability of cliffs and prey that can limit distribution or numbers of breeding falcons, competition for nesting cliffs with other raptors, and possible predation to eggs and young. Peregrine eyries occur throughout the canyon from remote river locations to cliffs bordering Grand Canyon Village on the south rim.

**Northern Goshawk – Species of Concern -** The northern goshawk is holarctic in distribution, occupying boreal and temperate forests of North America, Europe, and Asia (63 FR 35183-35184). It is the largest of the three *Accipiter* species present in North America. There is considerable debate regarding North American subspecies of the northern goshawk. *A. g. atricapillus* is recognized worldwide as occurring over much of Alaska, Canada, and forested regions of the western and eastern United States. Two other subspecies are variously recognized: *A. g. laingi*, which occurs on islands off the Canadian Pacific Coast; and *A. g. apache*, which occurs in mountains of the southwestern United States. The USFWS does not currently recognize the *apache* subspecies (63 FR 35183-35184).

Northern goshawks generally nest in stands of mature trees with a dense canopy. In the Southwest, goshawks most frequently occupy three forest types: ponderosa pine; mixed species (primarily Douglas fir and white fir); and Englemann spruce–sub alpine fir (*Abies lasiocarpa*). Nest sites are typically located on northerly slopes (Reynolds et al. 1992).

Although goshawks typically nest in stands of mature trees, they are forest generalists and use a variety of forest ages and types to meet their life history requirements (Reynolds et al. 1992, 63 FR 35183-35184). Various studies have shown that the mean size of a goshawk home range is around 5,000 acres (Reynolds et al. 1992), and these home ranges generally contain a mosaic of forest conditions. Goshawks prey opportunistically on a variety of small to mid-sized mammalian and avian species such as squirrels (Sciuridae), blue grouse (*Dendragapus obscurus*), rabbits, woodrats, doves (*Zenaida* spp.), jays (*Cyanocitta* spp.), and woodpeckers (*Picoides* spp.). Foraging habitat is probably as closely related to prey availability as to habitat structure or composition. Many prey species use snags, downed logs, woody debris, large trees, openings, and herbaceous and woody understories. Because goshawks are visually limited in habitats with dense understories, an open understory enhances detection and capture of prey (Reynolds et al. 1992).

**Data Sources.** Goshawk surveys have been conducted in Grand Canyon National Park. South Rim surveys were conducted regularly in 1991, 1992, and 1994-1996. Sporadic surveys also occurred in 1999 and 2000, and several nests were found. Surveys have also occurred on the North Rim, most recently in 2002 in areas affected by the Outlet Fire. Surveys continued in 2003 in areas on both the North and South Rims. The primary habitat for goshawks within the Park is in the mixed conifer and ponderosa pine habitat on the North Rim. There are approximately 10 known goshawks territories in the vicinity of the North Rim developed area, two of which are within the Bright Angel peninsula watershed. This is a small proportion of the over 100 territories on the North Kaibab plateau. There are no known goshawk nest areas within the vicinity of either the Widforss Trailhead or North Kaibab Trailhead proposed restroom locations. However, on the South Rim, goshawks have been detected within 1 mile of the proposed Yaki Point picnic area site.

**Threats.** There is a concern that populations and reproduction of the goshawk are declining in the western United States. These declines may be associated with forest changes caused by timber harvesting, but fire suppression, livestock grazing, drought and toxic chemicals may also be involved (Reynolds et. al 1992).

### **Niobrara Ambersnail**

A small population of Niobrara ambersnail (Succineidae: *Oxyloma haydeni haydeni*) is found at Indian Garden, Grand Canyon National Park's most heavily visited inner canyon site. This land snail population exists in a small amount of primary habitat (0.07 ha) composed of bulrush (*Schoenoplectus (Scirpus) americanus*) and cattails (*Typha domingensis*) along a spring system in upper Garden Creek. This is one of only two natural populations of this species known in Arizona; the other population exists at a spring at the Colorado River upstream from Lees Ferry. The Indian Garden population is one of only three natural populations of the genus *Oxyloma* known in Arizona. This population is genetically distinct, but is the most closely related taxon to the endangered Kanab ambersnail (*O.h. kanabensis*; Miller et al. 2000); however, the snail population is not presently protected as a federally listed endangered species.

The only proposed project area at Indian Garden is the rehabilitation of the composting toilet in the upper campground, approximately 0.10 miles upstream from the nearest Niobrara snail habitat. Ground disturbance would not occur and the possibility of disturbance of this key habitat (through direct disturbance or indirectly through sedimentation) is unlikely.

**Grand Canyon Catchfly – Species of Concern** – This perennial herb occurs in pinyon-juniper woodlands in loamy soils between 5,600 and 6,800 feet elevation. It is a member of the Caryophyllaceae family and is endemic to Grand Canyon National Park in Coconino County (Brian 2000). Locations within the Park include Bright Angel Trail near Garden Creek, the vicinity of Hermits Rest on the South Rim, upper Waldron Basin in upper Hermit Canyon, and along New Hance Trail in Red Canyon. Very little is known about the biology of this plant. It flowers late April to May and fruiting occurs May to June. It is typically found on north-facing slopes (AGFD 2000). Project areas that may have potential habitat for this species includes Hermits Rest, Indian Garden, Three Mile and Pipe Creek.

## APPENDIX E

### Foreseeable Future Actions

Foreseeable future actions related to visitor services and/or construction projects were considered to be actions that could occur in the vicinity of Grand Canyon Village within the next five years which currently have funding or for which funding is actively being sought. Below are brief descriptions of foreseeable future actions that were considered during the cumulative impact analysis.

### SOUTH RIM

#### GRAND CANYON VILLAGE AREA

**Greenway Trail – Phase III** – This approximately 7-mile segment of the Greenway Trail would provide a pedestrian/bicycle/equestrian trail from the future Grand Canyon Transit Center in Tusayan (located near the Park boundary) to Canyon View Information Plaza (the new orientation/transportation hub) within Grand Canyon National Park. This trail would provide an alternative means for nonmotorized access into the Park. It would also provide a separated experience from the existing road and vehicles entering the Park. The trail would be ten feet wide with a hardened surface and a stabilized shoulder made from a mix of aggregate and topsoil. An area 12 to 14 feet wide would be temporarily disturbed during construction. Design and construction would promote sustainability where possible and would strive to minimize impacts on the land. The trail would provide a possible extension of the Arizona Trail into the Park for hikers, cyclists and equestrian users. The trail would become part of the overall trail system in the Park and would be included in routine patrols by Park rangers. Construction on portions of this trail has begun, with completion expected sometime in 2004-2005.

**Mather Point Safety and Access Improvements** – Mather Point is one of the most visited viewpoints at Grand Canyon and is often a visitor's first view of the canyon. This point includes two overlooks, known as the East and West Overlooks. Both overlooks need improvements to meet current accessibility and safety standards. The pedestrian surfaces adjacent to the rim are uneven and guardrails need to be improved. In addition there is currently no access to the overlooks for visitors with accessibility issues. To address these concerns, the Park proposes to reconstruct the entrance to the East Overlook to provide a graded ramp leading to a barrier-free viewing platform. At the base of the point, the existing stairs would be removed and two new staircases would be construction to allow access to the lower portion of the point. Existing safety rails would be upgraded to meet current standards and new rails would be installed in some areas where necessary. At the West Overlook, a graded ramp would provide access to a barrier-free viewing platform to the west of the existing stairs. In some locations, vegetation would be pruned or removed to allow for better viewing from the rim. Uneven surfaces would be smoothed where possible to decrease safety hazards.

**Bright Angel Trailhead Rehabilitation** – This project would rehabilitate the Bright Angel Trailhead area historic landscape, which is used by nearly 4 million visitors a year. The preliminary proposal includes such things as repair of deteriorated stone walls, rehabilitation of pedestrian walkways, revegetation of denuded areas, and better definition of parking areas and walkways. The need for a restroom in this general area would also be evaluated. A cultural landscape report and preparation of a master concept plan for the area are components of the project.

**Market Plaza Shuttle Bus Stop** – With the opening of Canyon View Information Plaza and the expansion of shuttle bus operations, the bus stop at Market Plaza has become ineffective. Visitors are confused by the fact that buses are traveling in two directions, but using the same stop. Westbound buses must circle through the entire parking lot in order to enter the bus stop in the proper direction. There are pedestrian/vehicle conflicts causing safety concerns in this congested area. Proposed

improvements including repairing curbs, replacing asphalt, installing new benches and replacing the existing shelter. The Park also proposes to create a new bus stop across from the Canyon View Information Plaza access road and across from Yavapai Lodge. This new stop would serve westbound bus traffic while the rehabilitated existing stop would then serve only eastbound bus traffic. Construction is expected in Fall 2004.

**Potential Mass Transit Options** - Mass transit options for the park are currently being explored and include both light rail and bus options, or a combination of both. A transportation system may be developed from Tusayan to Mather Point and could include locations parallel to South Entrance Road. The planning and environmental documentation for this project is on-going. Implementation may occur within the next three – ten years.

**Privatized Housing** - New housing units may be constructed to replace existing trailers at the Pinyon Park housing area. Planning for this project has not yet begun. Implementation may occur within the next five years. Ground disturbance for this project is estimated at 0.5 acres.

**Village Interpretive Center or Heritage Education Campus (HEC)** - One National Landmark structure and four other National Register buildings near the powerhouse area of the historic district may be converted to interpretive and classroom space for the Heritage Education Campus. This would entail relocation of functions currently utilizing these buildings and renovation. Planning for this project has begun. Implementation of some of the first phases of this project would likely occur within the next five years. The HEC would utilize an area within the Village that is already developed with parking areas and buildings, etc.

**Park Headquarters Rehabilitation** - The Canyon View Information Plaza has replaced the visitor center function that used to occur at the park headquarters/visitor center building. This project would convert the extra space vacated by the visitor center function to administrative space, and would include additions to the building. Rehabilitation of the entire building would also occur with this project. This would include upgrading the heating and cooling systems, doors, windows, insulation, roofing, electrical, data communications, and mechanical systems. The rehabilitation would also include the installation of a fire sprinkler system and rehabilitation of the exterior to a historically accurate finish. Planning is currently underway for this project. Implementation may occur within the next five years.

**Yavapai Observation Station Rehabilitation** - This National Historic Landmark-eligible building, originally constructed in 1928, is in need of repair and rehabilitation. This project would rehabilitate both the interior and exterior of the building. All efforts are designed to preserve historic features and elements of the building while improving functionality, safety and accessibility for users. Ground disturbing activities are minimal and focused on the immediate area surrounding the building. Implementation is expected to occur in Fall 2005.

**South Rim Viewpoint Rehabilitation** – This project would address the need for maintenance and rehabilitation of approximately 14 viewpoints along Hermit Road and five viewpoints along Desert View Drive. Lack of consistent maintenance combined with heavy visitor use has resulted in deterioration of masonry structures, surface tread and fencing at these viewpoints. This project would rehabilitate these viewpoints including repairing masonry walls, stabilizing stone edging and retaining walls, asphalt repair and vegetation pruning. Implementation is expected to occur in the next year.

#### DESERT VIEW AND EAST RIM DRIVE

**South Rim Viewpoint Rehabilitation** – would occur at various locations along East Rim Drive, as described above.

**Desert View Restroom Renovation** – This restroom was constructed in 1999 in the parking area at Desert View. While the facility is adequately meeting the needs of visitors in this developed area, the appearance of the building is of concern. This project would alter the exterior of the building to be more compatible with the surrounding area. Specific components necessary for this “facelift” are still being explored. Implementation is expected to occur in the next two years.

#### HERMITS REST

**Hermit Road Rehabilitation** – Hermit Road (West Rim Drive) was originally constructed in 1911-1913 as a scenic roadway. The road was substantially upgraded in the early 1930’s and this alignment remains today. The road is in poor condition and numerous safety issues have been documented related to road condition including rippling and rutting in the pavement, loss of pavement along shoulders and frequent cracking. Currently the park operates a shuttle bus system on this roadway for most of the year and vehicular traffic is limited to shuttle buses, tour buses, service vehicles, and a limited number of private vehicles for visitors with disability needs. The road is open to all vehicle traffic during the winter (December – February). Bicyclists and pedestrians use the area year-round. Development of a pedestrian and bicycle use plan is a key component of the project. A primary objective for the project includes balancing the preservation of the historic road with improvements in safety and accessibility for vehicles, bicyclists and pedestrians. This project is expected to be implemented in 2007.

**South Rim Viewpoint Rehabilitation** – would occur at various locations along Hermit Road, as described above

#### NORTH RIM

**North Rim Development Plan** - The park has initiated a development planning effort for the purposes of further refining direction outlined in the GMP for transit, visitor orientation, and structure utilization on the North Rim. The boundary of the study area includes the State Highway 67 road corridor through the Kaibab National Forest between Jacob Lake and the park entrance, Lindberg Hill (which is currently used as an NPS fire camp), CC Hill, and the developed areas along the Bright Angel peninsula. Specific objectives include 1) improving visitor orientation and information services, 2) improving the distribution of visitor use on Bright Angel peninsula and Walhalla Plateau, 3) improving pedestrian and vehicle circulation at Bright Angel Point, and 4) preserving the rustic character of the North Rim. The project has entered the public scoping phase and specific proposed actions will be analyzed in an Environmental Assessment, expected to be released for public review in the next 6 months. Implementation for aspects of the plan would occur in phases, with some components implemented within the next 1 to 2 years.

**Greenway Trail on the North Rim** - The NPS is in the planning and analysis process for a segment of Greenway Trail between the North Kaibab Trailhead and the Grand Canyon Lodge. Greenway Trails are intended to provide greater access to outdoor trails thereby providing an alternative transportation opportunity (e.g. pedestrian/bicycle) for enjoying the park. The trail would follow the existing Bridle Trail and other social trails between the trailhead and the Lodge, with the intent of maintaining the rustic character of this area. The trail would not be paved and it is likely it would not fully meet Americans with Disabilities Act requirements, but would be improved in some areas. A soil stabilizer would be applied to make the trail surface more durable and thus easier to use. Grand Canyon National Park Foundation (the official fundraising partner and “friends group” for Grand Canyon National Park) provides funds for this project which is expected to be implemented in the Fall of 2004. The Greenway Trail system initially proposed in the 1995 General Management Plan (GMP) to Cape Royal and Point Imperial is on hold, pending future consideration.

#### CROSS CANYON CORRIDOR



**Corridor Fire Protection System Upgrades** - This project would install detection and alarm systems, automated sprinkler systems, and an enhanced and expanded standpipe hydrant network with associated equipment at several of the most vulnerable structures in the corridor. It would also upgrade the existing water system to enable it to deliver the volume and pressure needed to supply these systems. The standpipe network upgrade would install new hydrants capable of the required regulatory flow at key location with necessary hose boxes, fire hose, nozzles, and other required equipment. These upgrades would occur at Indian Garden, Phantom Ranch, Cottonwood Camp and Roaring Spring.

**Indian Garden Ranger Station Rehabilitation** – This building is listed on the National Register of Historic Places. This project would stabilize and possibly rehabilitate this historic 600 square foot building which is in need of repair to prevent further structural deterioration to floors, foundation and roof. A cultural landscape inventory is currently underway to help guide the project and aide in determining the best use of the building. Indian Garden is the most popular day-use destination in the inner canyon and serves approximately 75,000 visitors per year. Rotted structural components may be replaced and electrical and sewer systems may be upgraded depending on the use of the building. Site improvements may include walkway repair and installation and the addition of picnic tables and benches.

**Phantom Ranch Ranger Station Rehabilitation** - This project would include a full rehabilitation of the ranger station. Interior work would include such things as asbestos removal, removal of interior partitions, pest exclusion, replacement of plumbing, mechanical and electrical systems, installation of a sprinkler system, new flooring and interior finishes and new windows and doors. Exterior work would be limited to siding repair, roof repair, and some minor site work such as walkway repair. Only minimal maintenance to this building has been performed since its construction in 1961, due to its remote location. Although the building itself is not eligible for listing on the National Register of Historic Places, it is near the Phantom Ranch Historic District and the potential for impacts to this nearby district would be carefully evaluated during project planning. This project would significantly improve the quality of visitor services in this remote location (medical and visitor contact), and improve the health and safety of personnel assigned to this remote location. This area receives over 30,000 visitors per year.

**Revision of the 1988 Backcountry Management Plan** – As stated in a court settlement agreement (February 5, 2002 Grand Canyon Private Boaters Ass’n v. Alston, Case No. CV-00-1277-PCT-PGR-TSZ) NPS has agreed to publish a Notice of Intent to review and revise the Park’s Backcountry Management Plan, separate from the preparation of the Colorado River Management Plan, by the end of 2005. NPS expects this planning process and environmental documentation to take approximately 2-3 years to complete, at a minimum. Existing management activities in the backcountry and those proposed in this document would be reviewed and revised as appropriate during this planning process.

## APPENDIX F

### Minimum Requirement Analysis Worksheet

Parkwide Restroom Replacement, Rehabilitation and Installation

(Three Mile, Pipe Creek and Widforss Trailhead)

Grand Canyon National Park

#### PROPOSED ACTION

Installation of composting toilet at Three Mile and Pipe Creek along the Bright Angel Trail and replacement of a chemical toilet at Widforss Trailhead with a vault toilet

#### PART A: MINIMUM REQUIREMENT: Is this action necessary to manage the area as wilderness?

**1. IS THIS AN EMERGENCY?**

→ YES: Act according to approved emergency minimum tool criteria.

→ NO: XX

**2. IS THE PROPOSED ACTION ALLOWED BY LEGISLATION, POLICY, OR AN APPROVED MANAGEMENT PLAN?**

→ YES: Do according to approved criteria.

→ NO: XX

**3. CAN THE OBJECTIVES BE ACCOMPLISHED THROUGH AN ACTION OUTSIDE OF WILDERNESS?**

→ YES: Do it there.

→ NO: XX – Three Mile and Pipe Creek toilet locations are not located within proposed wilderness, but are along the cross-canyon corridor, adjacent to proposed wilderness. Widforss Trailhead is not located within proposed wilderness, but is adjacent to proposed wilderness in Threshold management zone NF9.

**4. DOES THIS ACTION CONFLICT WITH LONG-TERM WILDERNESS PLANNING GOALS, OBJECTIVES OR DESIRED FUTURE RESOURCE CONDITIONS?**

→ YES: Do not do action.

→ NO: XX

**5. CAN THE OBJECTIVES BE ACCOMPLISHED THROUGH AN ACTION THAT DOES NOT INVOLVE PROHIBITED USES?**

→ YES, Do it without actions or tools generally defined by the law and policy.

→ NO: XX→ **DO PART B**

As defined by law and policy, the use of motorized vehicles is generally prohibited “except as necessary” to meet the minimum requirement for the purpose of the administration of the area as wilderness. Managers must consider the impacts to the aesthetics and traditions of wilderness as well as the costs and efficiency of the equipment/transportation.

If you answered YES to all the above questions with references in Question 2, attach this to a Project Proposal, Permit, Action Plan, or appropriate document.

## **PART B: Determining the MINIMUM TOOL (*HOW the action should be done*)**

- 6. DESCRIBE IN DETAIL, ALTERNATIVE WAYS TO ACCOMPLISH THE PROPOSED ACTION.** (This may include primitive skills/tool, mechanized/motorized, and/or combination of alternatives.)

### Guiding questions to answer for each alternative:

- What is proposed?
- Where will the action take place? (location)
- When will the action take place? (dates/use periods)
- How often will this activity take place? (frequency)
- How long will it take to complete the activity? (duration)
- What design and standards will apply?
- What methods and techniques will be used? (tools, etc.)
- How many people are needed to complete the action?
- Why is it being proposed in this manner?
- If there are adverse impacts, how long will they persist?
- What mitigation will take place to minimize impacts?

### CRITERIA TO EVALUATE ALTERNATIVES:

- Biophysical effects (magnitude, duration, and frequency)
- Social/Recreational/Experiential effects
- Societal/Political effects
- Health/Safety concerns
- Economical and Timing considerations

**ALTERNATIVE A - No Action** – As described in the EA, The No Action

Alternative is considered and specifies that no toilets would be installed at Three Mile or Pipe Creek along the Bright Angel Trail. These high visitor use areas would continue to receive use by day hikers, mule riders and, in the case of Pipe Creek, river runners, resulting in human waste and toilet paper scattered throughout the sites. The chemical toilet at Widforss Trailhead would remain.

**ALTERNATIVE B - Preferred Alternative** – Install a 3-stall composting toilet at Three Mile, a 1-stall composting toilet at Pipe Creek and a prefabricated standard 1-stall vault toilet at Widforss Trailhead. Up to an estimated 15 – 20 helicopter flights would be required for transport of materials and supplies for construction of the toilet at Three Mile. Up to an estimated 7 – 10 helicopter flights would be required for transport of materials and supplies for construction of the toilet at Pipe Creek, for a total of approximately 22- 30 flights into the inner canyon during the construction period. Construction of the vault unit at Widforss Trailhead would take approximately 5 – 10 days and would require both heavy and light construction equipment.

Due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be used to periodically empty compost from the proposed toilets at Three Mile and Pipe Creek annually. However, as also described in the description of maintenance needs under the action alternatives, mules would be used instead of helicopters for this periodic compost removal IF additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile and a Half. Approximately 4 flights per year for each site (for a total of 8 flights annually) would be required for annual compost removal. If additional staff are added to the maintenance program and/or the program is otherwise brought up to capacity to deal with the additional needs for compost removal from two new inner canyon facilities, mules would be used for this annual removal. Approximately 5 days with 10 mules and 2 riders per year would be necessary for Three Mile and approximately 7 days with 10 mules and 2 riders per year would be necessary for Pipe Creek. Maintenance of the vault at Widforss Trailhead would be substantially reduced over current levels, due to the larger capacity of the vault and would likely occur once every 2 weeks. This alternative is described in detail on pages 15 – 29 of the attached EA. Mitigation measures that would apply to this alternative are included at the end of Chapter 2, starting on page 31. A summary of the expected effects of implementation of this alternative on aspects of wilderness resources and character are the subject of the special status species, soundscape, visitor experience and park operations sections of Chapter 3. The wilderness section summarizes the findings and makes a determination of effect to wilderness and wilderness character from implementation of Alternative B.

A preliminary option to address long-term compost removal needs at Pipe Creek was also discussed. As an alternative to mules or helicopter flights directly to and from Pipe Creek, an option to pack the waste with mules to Phantom and then flying it out with other scheduled flights was considered. This was subsequently dismissed from detailed analysis because it would require more staff time, more steps requiring human handling of waste, and would likely not result in an overall reduction in flights in the inner canyon, since flights would still be necessary from Phantom Ranch. The compost would not be appropriate for treating in the waste water treatment plant and would require separate flights.

**ALTERNATIVE C** – Install a smaller 2-stall composting toilet at Three Mile, and, as described for Alternative B, a one-stall composting toilet at Pipe Creek and a prefabricated standard one-stall vault toilet at Widforss Trailhead. Up to an estimated 10 – 15 helicopter flights would be required for transport of materials and supplies for construction of the toilet at Three Mile, reducing the total number of flights to 17 – 25 flights (a reduction of up to 5 – 13 flights).

As described for Alternative B, due to the limited staffing of the current inner canyon toilet maintenance program, helicopters would be used to periodically empty compost from the proposed smaller composter at Three Mile under Alternative C. However, as also described in the description of maintenance needs under the action alternatives, mules would be used instead of helicopters for this periodic compost removal IF additional staff are added to the maintenance program. If additional staff are added and mules can be used for this annual compost removal, the waste would be transported to the South Rim for disposal, as is currently done for the composting toilet at Mile

and a Half. Approximately 8 flights per year would likely be required for the waste removal from this smaller sized facility, to keep up with projected demand, essentially doubling the number of flights required for annual waste removal, as compared to Alternative B. If additional staff are added to the maintenance program and/or the program is otherwise brought up to capacity to deal with the additional needs for compost removal from this new inner canyon facility, mules would be used for this annual removal. Periodic empty/removal maintenance of the smaller Three Mile composter under this Alternative would require approximately 10 days with 10 mules and 2 riders per year. This alternative is described in detail on pages 29-30 of the attached EA. Mitigation measures that would apply to this alternative are included at the end of Chapter 2, starting on page 31. A summary of the expected effects of implementation of this alternative on aspects of wilderness resources and character are the subject of the special status species, soundscape, visitor experience and park operations sections of Chapter 3. The wilderness section summarizes the findings and makes a determination of effect to wilderness and wilderness character from implementation of Alternative C.

Both Alternatives described above and in the attached EA specify that other modes of transportation for construction materials into the inner canyon would utilize mules and/or boats as much as feasible. All personnel working on these projects would hike into the project locations and materials small enough and of the right size and dimension would be packed in on mules. Boat transport may also be used for Pipe Creek, but would have to be evaluated at the time of design to determine what would fit on a boat and could then be transported safely to the project site. While these methods would be emphasized and used when possible, some level of helicopter flights would be required for this project simply due to the location of the project areas and the size of the material needing to be transported.

While there is no alternative to some level of helicopter transport for Three Mile and Pipe Creek toilet construction (due to the remote locations of these sites and the large size and weight of some of the materials needed), methods to minimize this use would be used whenever feasible. The range in the number of flights (22 – 30 flights for Alternative B) is also an estimate based on preliminary estimated weights and sizes of materials. These estimates will be refined as the design for the proposed structures are refined in later planning phases for this project. This environmental assessment and the MRA included with this analysis would be reviewed for accuracy and updated if necessary when future design phases for the project are complete and current estimates are available. However, while some refinement in estimates is likely at that time, the range of flights estimated here (22 – 30 for Alternative B and 17 – 25 for Alternative C) is expected to be the maximum needed, i.e. the worst-case scenario. If it is determined that substantially more flights are needed than is portrayed in this analysis, this EA and MRA will be reviewed for accuracy and continued applicability, and revised if deemed necessary.

Other preliminary alternatives were also evaluated in an attempt to minimize the size of the structures at Pipe Creek and Three Mile, thus reducing the level of helicopter flights needed. Above-ground, 95-gallon capacity Romtec toilets were considered for both locations. These are used in several backcountry locations and require 1 – 2 flights for transport. As described on pages 12-13 of the EA, this alternative was dismissed from detailed analysis due to their small capacity. Both of the proposed sites occur along the Corridor and receive heavy use by day hikers and backpackers.

### **EVALUATE WHICH ALTERNATIVE WOULD HAVE THE LEAST IMPACT ON WILDERNESS RESOURCES, CHARACTER AND VISITOR EXPERIENCE WHILE ACHIEVING THE OBJECTIVES.**

Of the action alternatives, Alternative C would result in the fewest number of helicopter flights over wilderness to access project sites on the corridor, during the construction period. The flights necessary during the construction period would be one-time needs. Flights, however, are also proposed for periodic removal of compost from these toilets, as this will become part of the inner canyon toilet maintenance program. Because this program does not have adequate staffing at this time to use mules for this annual maintenance need, helicopters would be necessary (up to 8 flights per year for Alternative B and up to 12 flights/year for Alternative C). While Alternative C would result in the fewest

number of one-time flights during the construction period, it would result in a higher number of annual flights (unless additional staffing is allocated to this program and mules can be used for this) due to the fact that the smaller-sized toilet at Three Mile is not expected to adequately meet the visitor demand. Alternative C would construct a smaller two-stall composting toilet that would certainly improve the existing condition and meet the need for a toilet in this area, but it is not expected to meet projected future needs for this area. If a toilet is constructed that is too small for the level of use, it would result in much more frequent empty/removal trips and cleaning/servicing trips. It is anticipated that Alternative C may result in the need for helicopter flights over time for emptying/removal of compost, even if additional staff is added to the program, since even that might not be able to realistically keep up with the demand. Adequately sizing the facility for the anticipated use (Alternative B), while resulting in a higher number of flights at first, is expected to better meet the purpose and need for the project and the project objectives.

## **7. SELECT AN APPROPRIATE PREFERRED ALTERNATIVE.**

Alternative B is the preferred alternative